DOCUMENT RESUME

ED 164 804 CE 018 238

AUTHOR Nelms, Howard F.
TITLE Competency-Based Preservice Construction Trades Curriculum.
INSTITUTION Eastern Illinois Univ., Charleston. School of Technology.
SPONS AGENCY Illinois State Office of Education, Springfield. Div. of Adult Vocational and Technical Education.
PUB DATE Jun 78
CONTRACT RDE-B8-533
NOTE 154p.; For a related document see CE 018 239

EDRS PRICE MF-$0.83 HC-$8.69 Plus Postage.
DESCRIPTORS Bibliographies; Building Materials; *Building Trades; Carpenters; Construction (Process); *Curriculum Guides; Educational Objectives; Electrical Systems; Heating; *Housing; Landscaping; *Learning Activities; Painting; *Performance Based Teacher Education; Plumbing; Postsecondary Education; Prefabrication; Secondary School Teachers; *Teacher Education Curriculum; *Trade and Industrial Education

ABSTRACT

Intended for use at Eastern Illinois University in a model curriculum designed to prepare secondary school teachers in the field of residential building, this curriculum guide provides a competency-based preservice construction trades program. The guide is divided into thirteen units as follows: (1) pre-construction planning; (2) structural layout, incorporating clearing the site and topographic alterations; (3) building foundation; (4) forming, placing, and finishing concrete; (5) carpentry to frame the structure; (6) carpentry to enclose the structure; (7) plumbing; (8) heating and cooling; (9) electrical wiring; (10) carpentry to finish the interior, including thermal insulation; (11) painting and finishing of both the interior and exterior; (12) mechanical trades to complete the plumbing, heating and cooling, and electrical power; and (13) landscape design. Within each of the thirteen units, one or more sub-units are identified and specific performance objectives are given. A condition statement prefaces the listing of objective statements for each section. The types of learning activities used to attain the objectives vary from written exercises to the physical performance of the building tasks. Included at the end are an extensive bibliography of resource materials in printed and audiovisual formats and a list of resource organizations. (The final report of the project that produced this curriculum, and which also contains two additional subject areas, is available in ERIC--see note.) (ELG)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED164804

COMPETENCY-BASED PRESERVICE CONSTRUCTION TRADES CURRICULUM

by

Howard F. Nelms, Ed.D
Associate Professor
School of Technology
Eastern Illinois University
Charleston, Illinois 61920

Developed as a cooperative project with the
Research Development Unit
Board of Vocational Education and Rehabilitation
Department of Adult, Vocational and Technical Education
Illinois Office of Education
Springfield, Illinois

Contract #RDE-B8-533

June, 1978

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

C. Reisinger

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

CE 018 238

ACKNOWLEDGEMENTS

Rarely can one look to a single individual and indicate outstanding success with any specific program. Usually it is a group of individuals working toward common goals. The initiation and development of this Competency-Based Preservice Construction Trades Curriculum is such a group effort.

Appreciation is expressed to the many individuals who gave their time and knowledge in the preparation of this curriculum.

— Illinois Department of Adult, Vocational and Technical Education Staff —

James R. Galloway, Assistant Superintendent, Department of Adult, Vocational and Technical Education

William E. Reynolds, Coordinator, Professional and Curriculum Development Unit (currently manager of Planning and Reports Unit)

James B. Haire, Professional and Curriculum Development Unit (currently in Research and Development Unit)

Robert O. Metzger, Head, Occupational Consultant

Ronald D. McCage, Manager, Research and Development Unit

Nancy Harris, Research and Development Unit

— Eastern Illinois University Faculty/Staff —

Peter R. Moody, Ph.D, Provost and Vice President for Academic Affairs

Donald P. Lauda, Ph.D, Dean, School of Technology

Charles L. Joley, Ed.D, Director of Occupational Education

Charles W. Watson, MS, Industrial Technology

— Special Committees —

Two committees served this project. The time given to this project was generally stolen from an extremely busy and involved schedule. These individuals represent various construction trade, management and labor organizations. Their input into this curriculum project was much needed to reflect current conditions. We are grateful to members of the steering and advisory committees.

— Steering Committee Members —

Peter Billing, National Forest Products Association

Jerry Campbell, Home Builders Association of Illinois

Donald K. Dunn, U.S. Department of Labor Bureau of Apprenticeship and Training

Leon Elliott, Portland Cement Association of America

Robert Harrison, Mason Contractors Association of America

Jack D. Hughes, U.S. Department of Labor Bureau of Apprenticeship and Training

William Kuhne, American Institute of Constructors

Dorsey Moss, Department of Construction, Purdue University

Terry Paul, Home Builders Association of Illinois

James Schneider, Painting and Decorating Contractors of America

— Advisory Committee Members —

William Dempsey, Training Director, United Association of Plumbers and Pipe Fitters Local Union No.65, Forsyth, Illinois

Dan Llewellyn, Business Representative, Bricklayers Local No.17, Champaign, Illinois

Verlan McWilliams, Business Representative, Carpenters Local No.347, Mattoon, Illinois

Ralph E. Patzke, Executive Secretary, Joint Apprenticeship Committee of the Sheet Metal Industry, Champaign, Illinois

William Rollins, Coordinator of Apprenticeship and Training, Champaign County Carpenters Board of Apprenticeship and Training, Champaign, Illinois

Don Sanders, Superintendent, Farrier Construction Company, Charleston, Illinois

Robert E. Skipton, Director, Painting and Decorating Contractors Association, Inc., Springfield, Illinois

John Taylor, Business Representative, Electrical Workers Local Union No.146, Decatur, Illinois

— Special Acknowlegments —

The writer wishes to express his gratitude to his dissertation committee for approving and assisting with a study in construction. The questionnaire, data and findings of the study were instrumental in obtaining a two year grant from the Illinois Department of Adult, Vocational and Technical Education for the purposes of developing this curriculum and setting up implementation plans.

Recognition is extended to the following University of Northern Colorado faculty:

Dr. Robert G. Hammond, Major Adviser, Department of Industrial Arts

Dr. David Olson, Advisory Professor, Department of Industrial Arts

Dr. Kenneth E. Hogan, Advisory Professor, College of Education

Dr. Harald P. Christensen, Faculty Representative, Department of Political Science

Special recognition is also extended to Charles W. Watson, an industrial technology faculty member at Eastern Illinois University, for his expertise in developing an extensive bibliography for the convenience and professional development of educators and artisians who utilize this curriculum guide in the future.

—— Support Staff ——

We are grateful to the following individuals for their secretarial assistance in the development of this curriculum guide.

Bonnie Kimball	Virginia Butler
Janet Fraembs	Jackie R. Davis
Judy Sherman	Joyce Maurer

FOREWARD

In 1972, representatives of the Illinois Division of Adult, Vocational and Technical Education met on an informal basis to discuss the possibility of developing a curriculum guide that would be specifically designed for the preparation of certifiable residential building construction teachers and for use by in-service building construction teachers who need and desire additional skills and knowledge.

This publication is the result of the original and ensuing discussions that emerged from the initial meeting. It represents a coordinated effort among several construction trade management organizations and labor organizations.

The development of this curriculum has provided an opportunity for the author to utilize data collected as part of a doctoral study conducted at the University of Northern Colorado, School of Industrial Technology, Department of Industrial Arts. The majority of vocational building construction teachers currently employed in Illinois responded by providing input into this project, representing an educators point of view.

Administrative personnel in institution of higher education in Illinois who are responsible for quality teacher-education programs will discover that representatives of construction organizations from the "skilled craftsman" level to the "executive director" level enthusiastically subscribe to the idea that America needs educational programs with capabilities of helping to prepare highly competent construction craftsman, the nucleas of the building industry.

Howard F. Nelms, Ed.D
Associate Professor
School of Technology
Eastern Illinois University

PREFACE

There is a serious shortage of teachers qualified to instruct in construction trades programs at the secondary public school and community college level. Illinois Office of Education, Division of Adult, Vocational and Technical Education personnel and involved faculty members at Eastern Illinois University School of Technology have accepted the challenge to develop and implement a competency-based pre-service construction trades curriculum for the purpose of preparing residential construction trades teachers in those construction trade areas in which they are expected to be proficient.

Knowledge and skill competencies have been identified and written in performance terms. Skill and knowledge competencies have been arranged into units of instruction. A serious attempt has been made to present the material in a logical sequence, beginning with the planning of a residential structure and ending with a unit in landscape design to finish the total effort.

Approximately 78 percent of single family structures currently being sold have been manufactured by the growing pre-cut housing industry. We have chosen to prepare this curriculum guide along traditional lines of "stick building" because almost all construction programs in the secondary schools of Illinois utilize this approach as a teaching medium. Also the basic skill and knowledge competencies one must acquire are quite similar in both the pre-cut and stick building procedures.

The purpose of this curriculum is to assist construction teachers in their efforts to initiate, develop amd maintain a uniformly high caliber of thorough instruction by continually striving for personal professional teaching excellence. A second purpose is to provide suggestions, procedures, and extensive resources for state departments of education and institutions of higher education considering new or expanded programs in residential construction teaching.

This curriculum guide may be used as a supplemental source for the seasoned instructor's methods and materials. It should become a very worthwhile asset, especially for the novice instructor. Building construction teaching programs must remain flexible to meet new needs in response to ever-changing occupational requirements.

Dr. Howard F. Nelms
Project Director
Competency-Based Preservice
Construction Trades Curriculum

INTRODUCTION

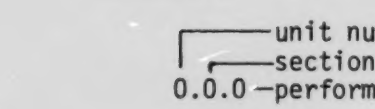
The curriculum guide is divided into thirteen units for the purpose of classifying the occupational trades under the broad category of Construction Trades Curriculum. The knowledge and skill competencies were converted to objectives stated in performance terms. The thirteen units separate the performance objectives into readily accessible divisions for teaching purposes.

Within each of the thirteen units of instruction one or more sub-units are identified for the purpose of classifying each unit into smaller sections. Each section is further divided into performance objectives which have been identified as essential for the prospective building construction teacher to master. All units, sections, and performance objectives have been arranged in logical sequence one should follow to teach the planning and construction of a residential structure in an educational setting.

Each performance objective is preceded by a condition statement near the top of each page that introduces a new section or unit. The outcome and criteria follow to complete the statement in performance terms. It should be made clear that some of the objectives do not contain specification criteria.

The identification of skill and knowledge competencies was performed by both experienced construction educators and competent craftsmen in each construction trade/occupation. The final list of skill and knowledge competencies was examined by each member of a specific construction trade/occupation. All advisory committee members who examined the competencies were selected on the basis of their competency within each construction trade/occupation. Each experienced years of practical experience in the construction trade represented.

NUMBERING SYSTEM EXPLANATION



To expedite the curriculum for quick reference and use a three place numbering system was used. The number holding the first place refers to the unit of instruction. The second place number indicates a section within the particular unit of instruction. The number holding the third place indentifies the performance objective within the designated section.

THE FIRST PLACE DIGIT REPRESENTS THE UNIT OF INSTRUCTION.

1.0.0 Preconstruction Planning
2.0.0 Laying Out the Structure
3.0.0 Building Foundation Masonry/Concrete Walls
4.0.0 Forming, Placing and Finishing Concrete - Horizontal
5.0.0 Carpentry - Framing the Structure
6.0.0 Carpentry - Enclosing the Structure
7.0.0 Plumbing - Rough-In
8.0.0 Heating and Cooling - Rough-In
9.0.0 Electrical - Rough-In
10.0.0 Carpentry - Interior Finish
11.0.0 Painting and Finishing
12.0.0 Mechanical Trades - Completion
13.0.0 Landscape Design

THE SECOND PLACE DIGIT REPRESENTS THE SECTION WITHIN A UNIT.

For example, unit #9.0.0 is divided into two sections and numbered respectively, 9.1.0 and 9.2.0.

Unit 9.0.0 ELECTRICAL ROUGH-IN
Section 9.1.0 Wiring the Interior
Section 9.2.0 Wiring the Exterior

The reader will recognize a 9.1 number as meaning the Electrical Rough-In unit (9) and Wiring the Interior as section (1). Unit number 13.0.0 has no section number; therefore the second digit is a zero.

THE THIRD PLACE DIGIT REPRESENTS THE PERFORMANCE OBJECTIVES WITHIN A SECTION.

Each performance objective within a specific section or unit is put into a suggested order of construction, however the instructor may desire to alter the sequence depending on each situation. The reader will recognize a number 1 in the third place as representing the first performance objective within that section. A 2 in the third place represents the second task within that section, 3, 4, continuing to the final performance objective for that particular section.

The number 9.1.1 would be recognized as Electrical Rough-In, the first section Wiring the Interior and the first performance objective within that section of the unit. In a similar manner 7.3.6 is defining the 6th performance objective of the 3rd section (Gas Distribution System) of the 7th unit (Plumbing - Rough-In).

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
FORWARD	iii
PREFACE	iv
INTRODUCTION	v
NUMBERING SYSTEM EXPLANATION	vi
PRE-CONSTRUCTION PLANNING	1.0.0
Energy Conservation - Residential Construction Planning Stage	1.1.0
Energy Saving Features - Existing Residential Structures	1.2.0
Planning the Structure	1.3.0
Selecting and Purchasing a Site	1.4.0
Planning the Living Space	1.5.0
Preparing Working Drawings	1.6.0
Writing Specifications	1.7.0
Financing and Contracting	1.8.0
LAYING OUT THE STRUCTURE	2.0.0
Clearing the Site	2.1.0
Installing Temporary Utility Services	2.2.0
Initiate Topographic Alterations	2.3.0
Design Surface and Ground Water Control System	2.4.0
Layout the Structure	2.5.0
BUILDING FOUNDATION	3.0.0
Crawl Space Construction	3.1.0
Basement Construction	3.2.0
FORMING, PLACING, AND FINISHING CONCRETE - HORIZONTAL	4.0.0
Subgrade Preparation	4.1.0
Formwork	4.2.0
Concrete Requirements	4.3.0
Placing Concrete	4.4.0
Finishing Concrete	4.5.0
Curing Concrete	4.6.0

CARPENTRY - FRAMING THE STRUCTURE 5.0.0
Sill and Floor Framing 5.1.0
Wall and Partition Framing 5.2.0
Roof Framing 5.3.0

CARPENTRY - ENCLOSING THE STRUCTURE 6.0.0
Roofing Materials and Application 6.1.0
Exterior Finish Trim and Wall Coverings 6.2.0

PLUMBING ROUGH-IN 7.0.0
Waste Disposal System 7.1.0
Fresh Water Distribution System 7.2.0

HEATING AND COOLING ROUGH-IN 8.0.0
Heating and Cooling Installation 8.1.0

ELECTRICAL ROUGH-IN 9.0.0
Wiring the Interior 9.1.0
Wiring the Exterior 9.2.0

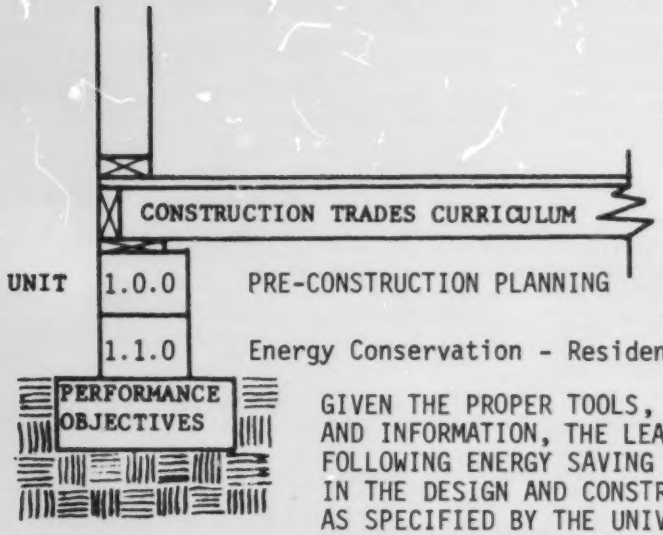
CARPENTRY - INTERIOR FINISH 10.0.0
Thermal Insulation 10.1.0
Interior Wall and Ceiling Finish 10.2.0
Interior Trim 10.3.0
Floor Coverings 10.4.0

PAINTING AND FINISHING 11.0.0
Interior Painting and Finishing 11.1.0
Exterior Painting and Finishing 11.2.0

MECHANICAL TRADES - COMPLETION 12.0.0
Plumbing - Completion 12.1.0
Heating and Cooling - Completion 12.2.0
Electrical Power - Completion 12.3.0

LANDSCAPE DESIGN 13.0.0

SELECTED BIBLIOGRAPHY 14.0.0
Printed Resources 14.1.0
Technical Journals, Periodicals and Trade Magazines . . . 14.2.0
Audio Visual Resources 14.3.0
Curriculum Resources 14.4.0
Allied Associations, Socities and Institutes 14.5.0
Labor Organizations 14.6.0
Codes and Standards Organizations 14.7.0



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL EXAMINE EACH OF THE FOLLOWING ENERGY SAVING METHODS/TECHNIQUES AND APPLY THEM IN THE DESIGN AND CONSTRUCTION OF A RESIDENTIAL STRUCTURE AS SPECIFIED BY THE UNIVERSITY OF ILLINOIS SMALL HOMES COUNCIL-BUILDING RESEARCH COUNCIL.

1.1.1 Arrange the location of a residential structure on a selected site to take maximum advantage of the sun as a source of heat during the winter and protection from solar heat gain during the summer months.

1.1.2 Insulate crawl-space foundations to reduce heat loss through the floor above.

1.1.3 Insulate basement walls to reduce heat loss through the floor above.

1.1.4 Install rigid insulation at the edge of concrete slab floors exposed to the exterior.

1.1.5 Place insulation in exterior walls of standard thickness or increase wall thickness to permit increased insulation thickness.

1.1.6 Place insulation in attic above the ceilings of heated areas. Select type of insulation for ease of installation and maximum resistance to heat passage.

> NOTE: WHEN CEILING INSULATION EXCEEDS 6 INCHES IN THICKNESS THE HEAT LOSS THROUGH THE CEILING IS ALMOST NEGLIGIBLE.

1.1.7 Install double or triple layers of glass on all windows for decreased heat transfer to the exterior.

1.1.8 Install storm doors to doors exiting to the exterior.

1.1.9 Design the floor plan of a residential structure containing the least wall exposure through which heat escapes.

1.1.10 Include in your design roof overhang for the protection of the wall surface against weather.

1.1.11 Design the roof overhang on the south wall to protect the wall from the summer sun and expose the wall to the winter sun.

1.1.12 Include a vestibule with an inner door to reduce the flow of outdoor air into living quarters of your home.

1.1.13 Reduce window areas when feasible. A double glazed window will lose about seven times as much heat as a well-insulated wall of the same area.

1.1.14 Develop house designs that emphasize rooms partly underground for additional protection against weather.

1.1.15 Locate chimney inside the house on an inside wall for maximum heat gain to the interior.

1.1.16 Draperies over windows will trap cool air at the window for some prevention of heat loss.

1.1.17 Install adequate insulation in the floors of rooms over unheated areas, such as garages.

1.1.18 Install a compressible sill plate sealer on top of the foundation wall before the sill plate is fastened to the wall for the purpose of reducing air infiltration.

1.1.19 Plan for the use of light-colored roof surfaces that reflects sun radiation more than a dark color. (Roof color is not a factor if attic ventilation is adequate.)

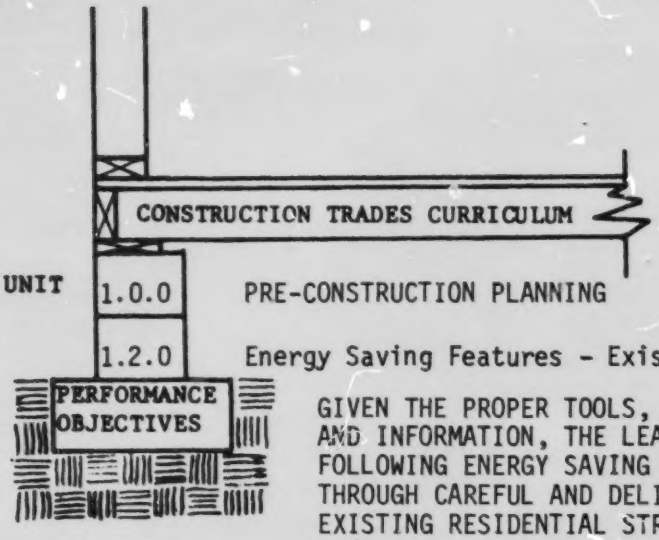
1.1.20 Provide for sufficient attic ventilation for removal of heated air and moisture.

1.1.21 Design porches to shade walls and windows from solar heat gain.

1.1.22 Arrange glass locations, when feasible, to face the south.

NOTE: SOLAR HEAT GAIN THROUGH UNSHADED EAST AND WEST WINDOWS IS TWICE AS GREAT AS THROUGH WINDOWS OF EQUAL SIZE ON SOUTH WALLS.

1.1.23 Include in your planning several methods of window shading to reduce solar heat gain.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL EXAMINE EACH OF THE FOLLOWING ENERGY SAVING FEATURES THAT MAY BE ACHIEVED THROUGH CAREFUL AND DELIBERATE EFFORT BY THE OWNERS OF EXISTING RESIDENTIAL STRUCTURES.

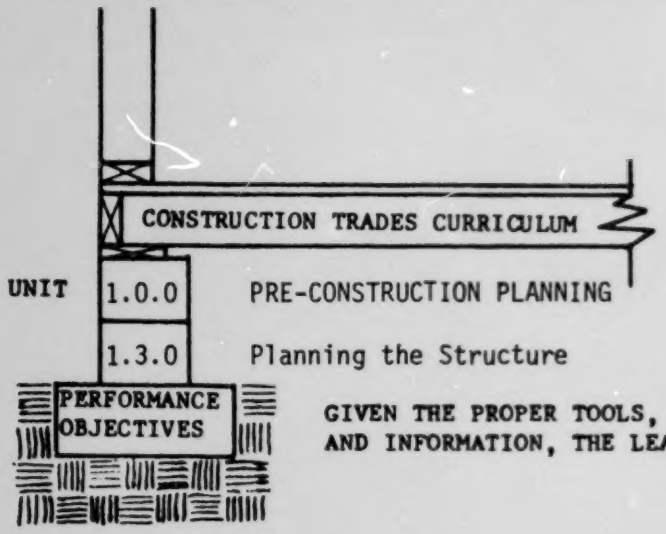
1.2.1	ATTIC/ROOF VENTILATION	Adequate air movement out of attic prevents condensation and reduces cooling loads.
1.2.2	BAND JOIST INSULATION	Insulation should be stapled or wedged behind hard to get at band or header joists.
1.2.3	BASEMENT WALL INSULATION	Insulating interior of basement walls can save energy and make space more usable.
1.2.4	CALK AROUND WINDOWS AND DOORS	All wall openings should be caulked to reduce infiltration.
1.2.5	CAULK JOINTS	All joints where metal or masonry meet wood should be caulked to reduce air infiltration.

1.2.6	CAULK OPENINGS FOR MECHANICALS	All exterior openings for pipes, wiring, and ducts should be caulked to reduce air seepage.
1.2.7	CEILING INSULATION	Recommended rating varies by area from R-19 in mildest climates to R-38 in coldest climates.
1.2.8	CLOCK THERMOSTAT	Clock thermostats automatically set night/day temperatures for reduced heating costs.
1.2.9	DUCTS INSULATED	Heating and cooling ducts in un-condition spaces should be wrapped with insulation.
1.2.10	ENERGY EFFICIENT APPLIANCES	Use appliances specially designed to conserve hot water and use of power.
1.2.11	ENERGY EFFICIENT HOT WATER HEATER	Extra insulated hot water tanks can keep water hotter longer thereby saving on fuel.
1.2.12	HEAT PUMP	Heat pump provides both heating and cooling with a high degree of energy efficiency.
1.2.13	HIGH EER AIR CONDITIONING	Median EER (energy efficiency ratio) for central systems is 6.8. Highest is 10.

1.2.14	IN-THE-WALL-INSULATION	Use full-thick insulation between wall studs.
1.2.15	INSULATED CRAWL SPACE	Crawl spaces with heat ducts need insulation on perimeter walls and a vapor barrier on the ground.
1.2.16	INSULATED SHEATHING	Highly insulated rigid sheathings help bring exterior walls up to recommended ratings.
1.2.17	INSULATED SLAB-ON-GRADE	Rigid perimeter insulation is needed for the reduction of heat loss at the intersection of the floor and outside masonry foundation wall.
1.2.18	INSULATION BEHIND OUTLETS	Insulation behind electrical outlets and plumbing pipes located within outside walls reduces air infiltration.
1.2.19	METAL WINDOWS WITH THERMAL BREAKS	In metal windows non-conducting thermal breaks should separate indoor/outdoor frame faces.
1.2.20	MUTIPLE GLAZED WINDOWS	Double glass is recommended in all areas. Triple glazing best in the coldest areas.

1.2.21	PROPERLY SIZED HEATING/COOLING EQUIPMENT	Oversized heating and cooling equipment costs more, decreases efficiency and wastes energy.
1.2.22	ROOF OVERHANGS	Properly sized roof overhangs can reduce heat gain at windows by up to 50%.
1.2.23	SILL SEALER INSULATION	Install between the top of the foundation wall and the sill plate to help reduce air infiltration.
1.2.24	SOLAR HEATING, COOLING AND WATER HEATING	Solar energy systems are practiced in parts of the country where sunshine is plentiful and other energy costs are high.
1.2.25	STORM DOORS	Storm doors can stop up to 50% of energy wasting air infiltration.
1.2.26	THERMAL EXTERIOR DOORS	Wood exterior doors should be solid core. Metal doors should have an insulated core and a thermal break.
1.2.27	VAPOR BARRIERS	Vapor barriers are extremly desirable for the purpose of preventing damaging condensation. Install on the warm side of the insulation. (Heating season)

1.2.28	WATER-SAVING FAUCETS	Water-saving faucets save energy used to heat water.
1.2.29	WATER-SAVING SHOWER HEADS	Water-saving shower heads or flow control valves can reduce hot water use by 50%, saving energy and money.
1.2.30	WEATHERSTRIPPED EXTERIOR DOORS	Install on sides, top and bottom (threshold) of all exterior doors to help reduce air infiltration.
1.2.31	ZONE CONTROL HEATING/COOLING	Two or more thermostats maintain different temperatures in different areas for efficiency and saving in energy consumption.



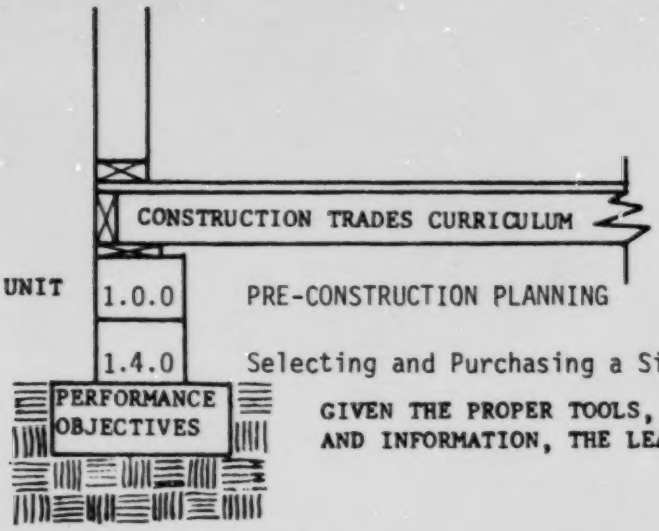
GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

1.3.1 Compile a list of ten individual and family activities that influence the space needs in a residential structure.

1.3.2 State a generally accepted guide covering the cost a family may safely spend for all housing expenses.

1.3.3 Contrast six basic elements of building design and give one practical example of each.

1.3.4 List ten responsibilities an architect will assume when employed by a prospective new house owner.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

1.4.1 List ten neighborhood evaluation criteria one should consider prior to the purchase of a residential building site.

1.4.2 Write ten topographical pieces of information a prospective purchaser should investigate before the site purchase is consummated.

1.4.3 Compare three different zoning classifications usually used to regulate orderly city growth.

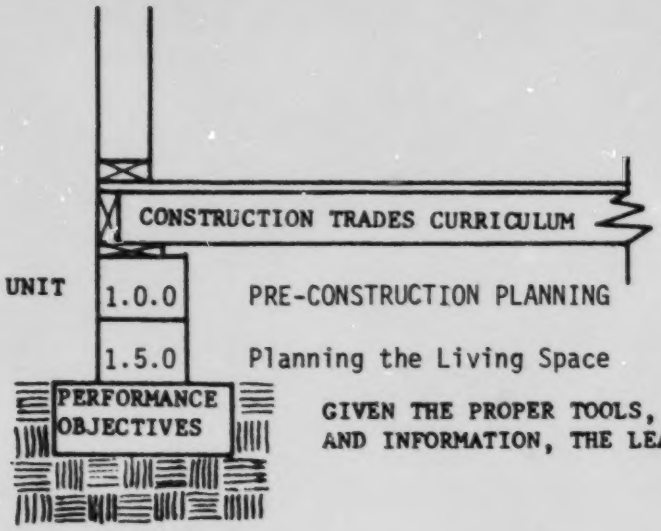
1.4.4 Acquire a list or write the local residential building code restrictions for plumbing, electrical, and building construction.

1.4.5 Identify four utility services available locally and compare the installation services provided by each utility firm.

1.4.6 List the principal purpose for a title search, deed to real estate, and easements attached to property.

1.4.7 Identify, in order of occurrence, three steps customarily followed when purchasing a site for construction purposes.

1.4.8 Differentiate the load bearing capacities (in tons per square foot) of soft clay and sandy loam, firm clay and dry fine sand, and hard dry clay.

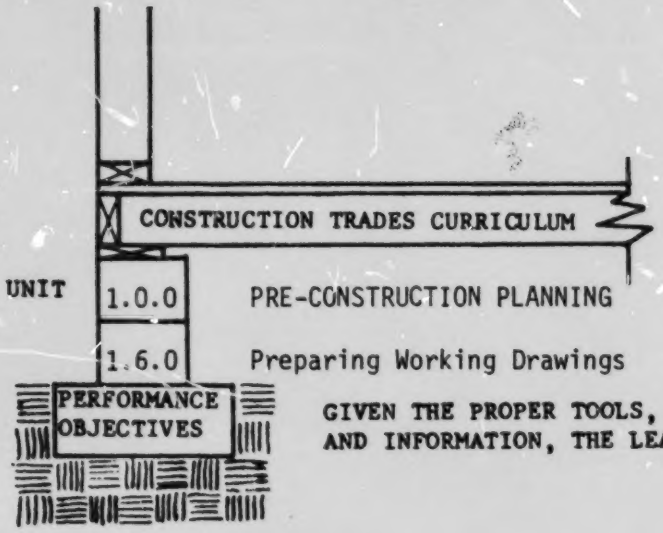


GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

1.5.1 Make a scale freehand sketch on graph paper of a floor plan for a single family residential structure to include the sleeping, living, service, work and private areas according to Federal Housing Minimum Property Standards for single family residences. Scale is to be ¼" = 1'0".

NOTE: A SUITABLE FLOOR PLAN FROM AVAILABLE PRINTED MEDIA MAY SERVE AS A GUIDE FOR PRIMARY ROOM LAYOUT.

1.5.2 List a minimum of ten factors to consider when planning a residential structure for efficient traffic flow.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

1.6.1 Draw a plot plan for a residential structure according to Federal Housing Minimum Property Standards for Single Family Residences. Scale is to be 1" = 20' - 0".

1.6.2 Draw a floor plan for a residential structure according to Federal Housing Administration Minimum Property Standards for Single Family Residences. Scale is ¼" = 1' - 0".

1.6.3 Draw a foundation/basement plan for a residential structure according to Federal Housing Administration Minimum Property Standards for Single Family Residences. Scale is ¼" + 1' - 0".

1.6.4 Make drawings of each elevation for a residential structure according to Federal Housing Administration Minimum Property Standards for Single Family Residences. Scale is ¼" = 1' - 0".

1.6.5 Design and draw an electrical plan for a single family residence to meet local and national electrical code specifications.

NOTE: THE FLOOR PLANS MAY BE USED TO DRAW THE ELECTRICAL PLAN.

1.6.6 Draw detail/section drawings of exterior wall, stair wells, landings and stairs, roof trusses, fireplace, kitchen cabinets indicating shelving and special critical construction points. Select scale and complete to Federal Housing Administration Minimum Property Standards for Single Family Residences.

1.6.7 Make a two-point perspective drawing of a single family residence illustrating how a finished structure will look. Scale is to be ¼" = 1' - 0".

1.6.8 Following local / national building codes, draw a roof plan for a single family residence.

NOTE: THE ROOF PLAN MAY BE INCLUDED ON THE PLOT PLAN.

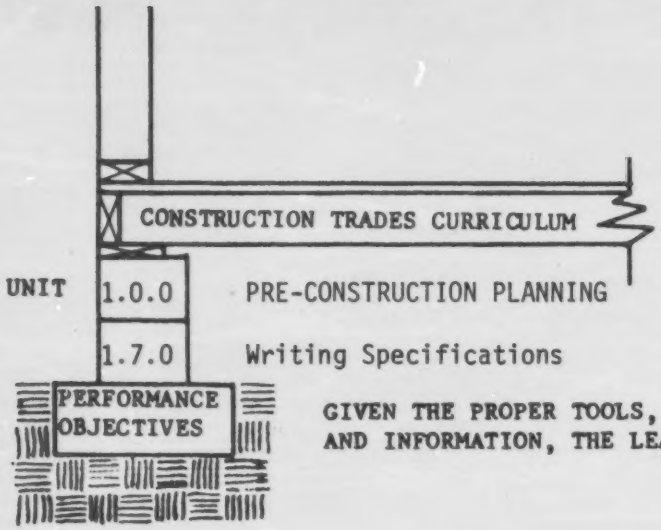
1.6.9 Draw a roof framing plan for a single family residence that shows the rafters, ceiling joists, and supporting members. Draw to specifications provided by local/national building code requirements.

1.6.10 Draw a floor framing plan to local/national building code requirements for a single family residence. Include direction of floor joists and major supporting members.

1.6.11 Select a commonly used fuel available locally for heating and cooling a single family residence and draw a heating/cooling plan in compliance with the National Warm Air Heating and Air Conditioning Association or other FHA recognized associations.

1.6.12 Draw a plumbing plan for a single family residence in compliance with the local/state/National Plumbing Code and FHA Minimum Property Standards for single family residences

1.6.13 Draw a landscape plan including suitable automobile and pedestrian access from street to dwelling, grading of site to provide division and disposal of surface water, lawn/ground cover, trees and shrubs, retaining walls and fences. Installations are to be in compliance with Federal Housing Administration Minimum Property Standards for single family residences.

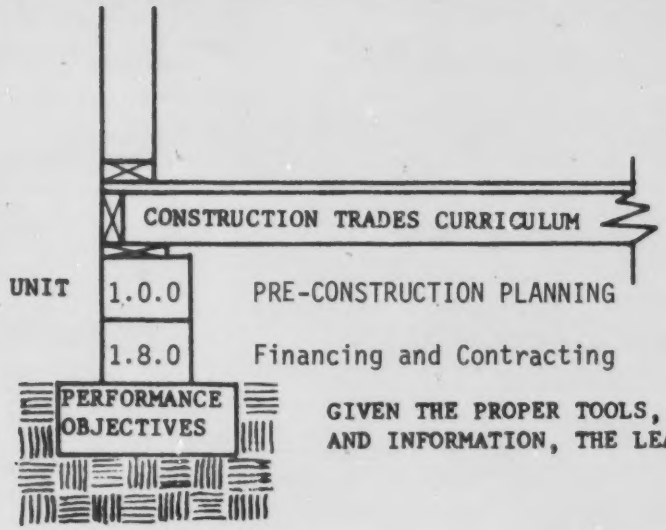


GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

1.7.1 Write the specifications for the construction of a single family residence using the most recent standard Veterans Administration form 26-1852 or Federal Housing Administration form 2005.

1.7.2 Calculate the labor and material cost for a single family residential structure in your locality. Use a standard printed form for estimating.

NOTE: SEE "TAKE OFF" GUIDE.

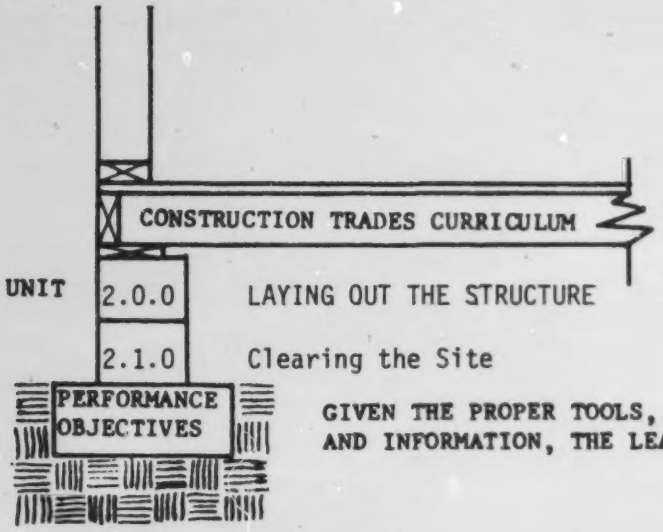


GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

1.8.1 List in writing the types of mortgage loans available for single family construction, the interest rate for each type loan, the percentage of down payment required for each type of loan, and the total repayment amount from an amoritization schedule for twenty, twenty-five, and thirty year loans. Request an amount of money to pay for the construction of a single family residence you or your class is planning.

1.8.2 Contracts to build a single family residence are generally written arrangements between the owner and the firm/business/individual providing the construction services. List in writing three (3) of the most common contractual arrangements and a minimum of three (3) characteristics of each method of contracting.

1.8.3 Identify three kinds of mortgages that can be obtained under approved state laws for the purpose of financing the construction of a single family residence. Draw a table which will compare the characteristics of each kind of mortgage.



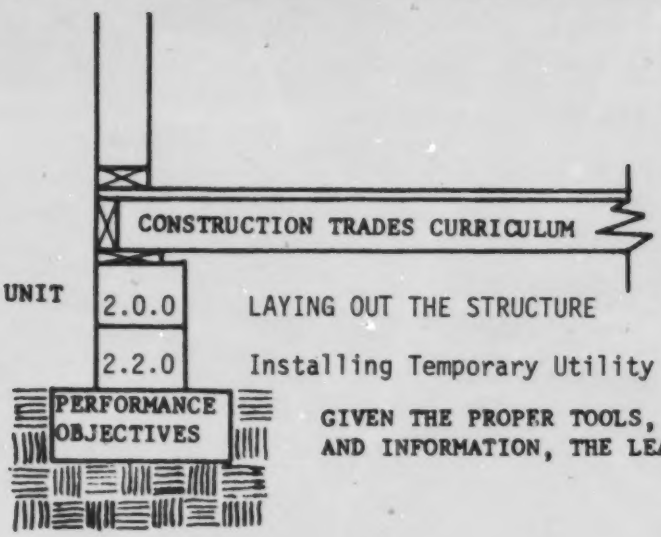
GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

2.1.1 Select and make provisions for protecting vegetation/structures to be retained according to written specifications and information on the architectural drawings.

2.1.2 Clear the site to accommodate the new structure.

2.1.3 Locate existing sub-grade service installations and protect from damage by location identification.

2.1.4 Write at least four of the most common site clearing practices.



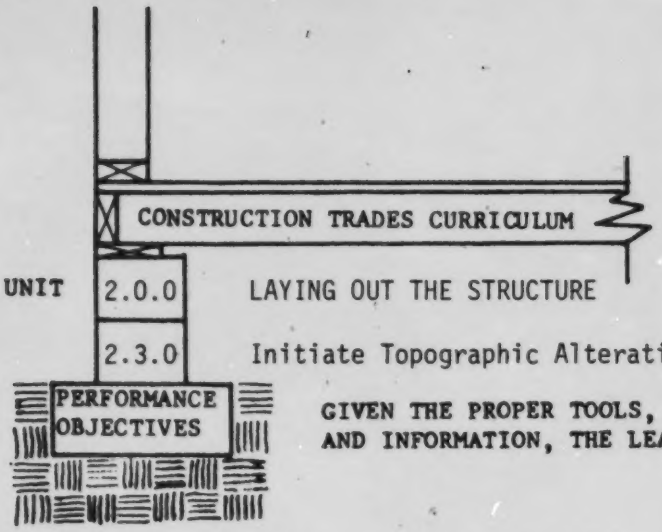
GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

2.2.1 Locate and install a temporary electrical service according to local power company specifications.

2.2.2 Locate and make provisions for temporary telephone service according to local telephone company requirements.

2.2.3 Visit the local police department and apply for special protection during the construction period.

2.2.4 Contact all neighbors within one block of the proposed structure and respectfully solicit their cooperation in protecting the proposed construction project from possible vandalism and possible legal moves in case of injury to unauthorized visitors to the site.

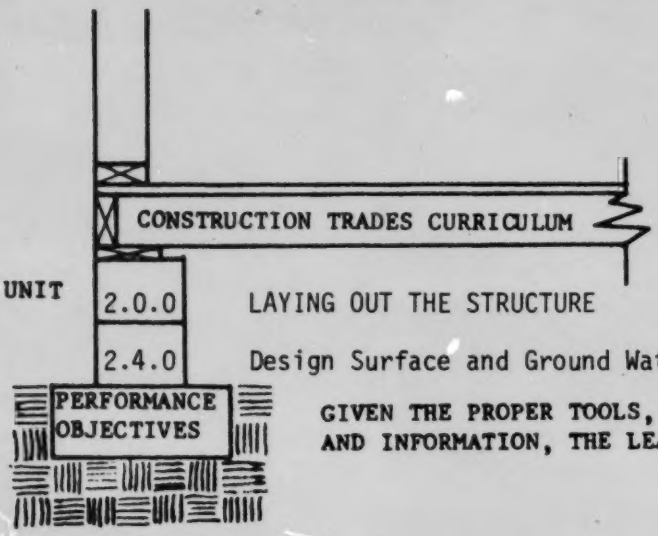


GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

2.3.1 Examine topsoil of prospective construction site and make recommendations for two methods of removal and storage.

2.3.2 Employ a reputable subcontractor to make topographic changes on the prospective construction site by using fill from the existing site or fill transported from off-site locations by truck if needed.

2.3.3 Employ a reputable subcontractor to complete grading and leveling operations according to specification standards and directions included on the architectural drawings.

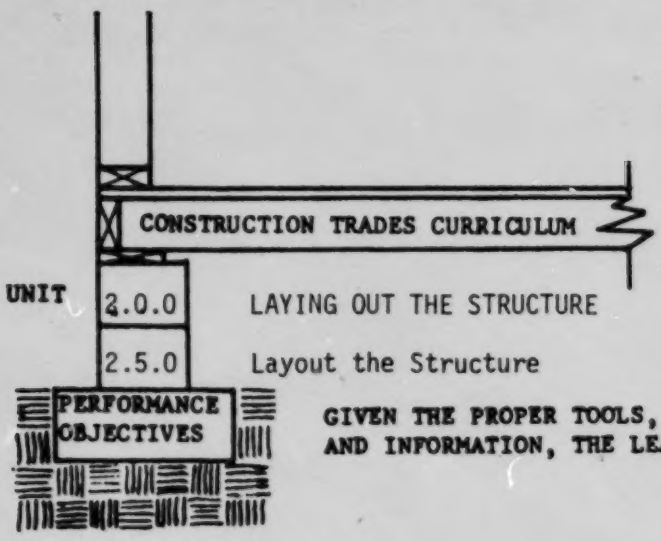


GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

2.4.1 Establish the directions of surface water flow according to adjacent terrain and sub-division/city/rural building code requirements.

2.4.2 Identify a commonly used basement ground water control system, list the materials used, and write the installation specifications.

2.4.3 List three methods of removing water that may collect at the site during construction.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

2.5.1 Verify the property boundaries according to measurements on the site plot plan. (A metal surveyor's pin should exist at each corner of the property.)

> NOTE: A SHOVEL IS USUALLY NEEDED TO UNCOVER PINS.

2.5.2 Stake the ends of the building setback line and side yard distance requirements to within ± ¼ inch.

2.5.3 Stake out location of the outer walls of the structure by measuring from an established reference line (building set-back line) and drive stakes at all corners of the structure.

2.5.4 Set up and level a builders/transit level to bubble level observation accuracy.

2.5.5 Ascertain the bench mark from which elevation distances are measured according to the architectural drawings and calculate the height of the foundation top.

2.5.6 Establish elevation to assure correct driveway slope, surface drainage direction and slope. Follow specifications according to architectural drawings or Federal Housing Administration specifications.

2.5.7 Calculate the excavation depth and mark on 2 X 4 stakes driven in the ground at approximately 45^{0} angles and four feet away from each outside corner of the structure.

> NOTE: WHEN USING SOIL AS A FOOTING FORM FOR CONCRETE, REDUCE THE EXCAVATION DEPTH BY THE FOOTING THICKNESS PLUS TWO INCHES TO REDUCE SPILLOUT WHEN PLACING CONCRETE IN DUG TRENCHES (FORMS).

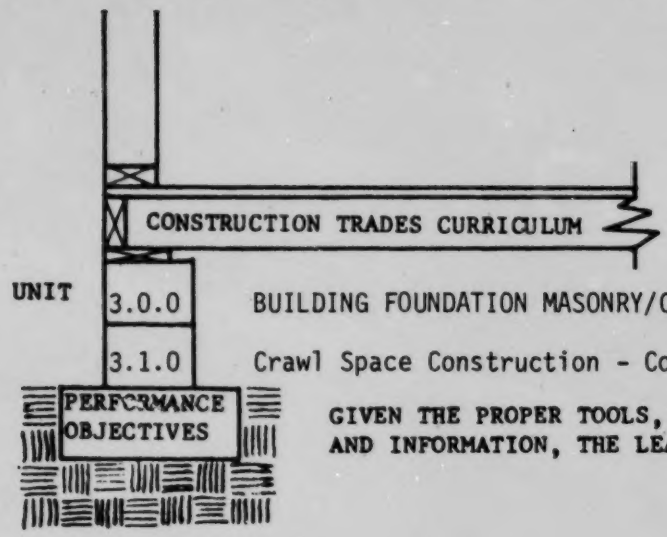
2.5.8 List three purposes that batter boards serve as a construction device.

2.5.9 Erect and level batter loards at all corners of the proposed foundation wall to a tolerence of ± 1/8 inch.

2.5.10 Establish the outline of the foundation wall by measuring and marking on the top surface of the horizontal members of the batter boards.

2.5.11 Square the foundation layout to within ± ¼ inch by stretching string or light wire to represent the outside edge of the foundation walls and compare the diagonal measurements.

2.5.12 Establish footing line locations on batter boards to tolerance of ± 1/8 inch.



BUILDING FOUNDATION MASONRY/CONCRETE WALLS

Crawl Space Construction - Concrete Block

GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

3.1.1 Name two pieces of mechanical equipment usually employed for the removal of soil prior to the construction of footings and foundation walls in crawl space and basement construction.

3.1.2 Employ a competent subcontractor to excavate to a predetermined depth as indicated on the corner batter board stakes. The learner will check depth and serve as an assistant to the earth moving equipment operator.

NOTE: WHEN USING A TRENCH IN THE SOIL AS A FOOTING FORM FOR CONCRETE, REDUCE THE CRAWL SPACE EXCAVATION DEPTH BY 2 INCHES TO MINIMIZE SPILLOUT WHEN PLACING CONCRETE IN THE TRENCH. (FORMS)

3.1.3 Draw to scale a cross section of a rectangular and a flared footing recommended for use in the construction of the typical single family residence. Dimension the height, width, maximum projection of the footing and the foundation wall width.

3.1.4 Name two techniques for preparing foundation wall and pier footing forms. Include materials, sizes and placement of forms parts.

3.1.5 Layout and construct foundation wall footing forms and prepare earth footing forms by trenching into the soil to a specified width and depth.

3.1.6 Calculate the elevation for the top of the foundation wall footing and the top of pier footings.

3.1.7 Locate and place leveling pins in the trenched footing forms at each wall intersection, spaced approximately eight feet on center and centered between the sides of the trench. Set leveling pin height by string or builders level.

3.1.8 Locate public water main, layout location of trench to approximate center of excavation, excavate trench to depth required by local plumbing code, and employ sub-contractor to install water service line and meter housing.

NOTE: WATER IS NEEDED TO MIX MORTAR FOR BLOCK FOUNDATION WALL CONSTRUCTION.
NOTE: WATER METER HOUSING INSTALLATIONS ARE COMPLETED BY CITY EMPLOYEES IN SOME COMMUNITIES. WATER AND SEWER TAPS ARE GENERALLY SUPERVISED OR PERFORMED BY WATER DEPARTMENT EMPLOYEES.

3.1.9 List in writing the ingredients used to prepare concrete and the primary function of each.

3.1.10 Write the meaning of a concrete mix corsisting of a "ratio of 1:1:4".

3.1.11 Calculate the cubic yards of concrete needed for the foundation footings of a proposed residential structure.

3.1.12 Place and level five (5) bags redi-mix concrete in foundation wall and pier footing forms.

3.1.13 List two plastic (wet) mortar properties and three hardened mortar properties.

3.1.14 Classify the mortar type recommended for general use in above grade masonry and give the preparation limitations of the mortar mix in volume as recommended by ASTM. (American Society for Testing and Materials)

3.1.15 Measure and mix mortar ingredients until the mortar is uniform, cohesive, and of a consistency that makes it usable.

3.1.16 List four characteristics of mortar that has been properly prepared.

3.1.17 Add water to mixed mortar that has stiffened (less plasticity) because of evaporation in amounts to regain the proper workability of the mix.

3.1.18 Spread mortar on masonry units (concrete blocks) until the fundamental skills have been developed.

3.1.19 Sketch to scale six common types of tooled mortar joints.

3.1.20 Tool vertical and horizontal mortar joints into concave shapes when the mortar has become "thumbprint hard" or when the mortar is compacted.

3.1.21 To reduce cutting, establish head joint location and allowance for mortar joints by stringing out (placing) the first course of masonry wall without mortar. Adjust for minimum cutting by varying size of mortar joint between masonry units.

3.1.22 Layout and cut concrete line blocks to specified lengths within a tolerance of ± 1/8 inch.

3.1.23 Layout and saw concrete line blocks to specified length.

3.1.24 Layout concrete block corner lead four or five courses above the footing. Each course is to be aligned, level, and plumb as it is laid.

3.1.25 Lay stretcher (line) blocks between the corner leads to line.

NOTE: REMEMBER TO PLACE CRAWL SPACE FOUNDATION VENTS, WINDOWS, FAN EXHAUSTS, ETC. WHEN SPECIFIED ON ARCHITECTURAL DRAWINGS.

3.1.26 Cut to size and lay up a closure block in one or more courses.

3.1.27 Layout and lay up concrete block piers according to local building codes or as specified in the Federal Housing Administraiton Minimum Property Standards for one and two living units.

3.1.28 Construct a pilaster with concrete blocks of two widths alternating the two size (width) blocks for the purpose of tying the pilaster into the foundaton wall.

3.1.29 Construct a load bearing wall intersection by installing a metal tiebar for lateral support.

3.1.30 Tie a nonbearing block wall to an adjacent wall using strips of metal lath or ¼ inch mesh galvanized hardware cloth.

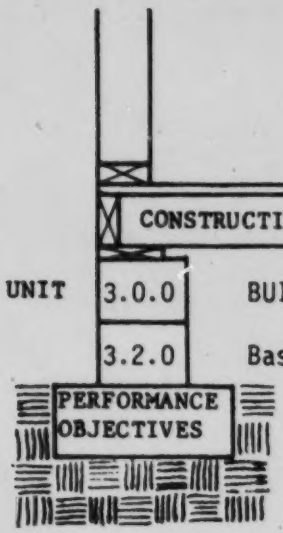
3.1.31 Place wood foundation sill anchor bolts at approximate 4 foot intervals in the cores of the top two courses of blocks directly beneath the foundation sill.

3.1.32 List at least four types of insulation that is available for the purpose of decreasing the rate of heat loss through crawl space and basement foundation walls.

3.1.33 Install insulation to crawl space perimeter/basement perimeter walls to provide an "R" value not exceeding that for the first floor exterior walls.

3.1.34 List three common methods of termite protection recommended for use in the particular geographic area where the construction is occuring; select the appropriate method of control and install, apply, or treat as circumstances dictate.

3.1.35 Employ a competent sub-contractor to backfill the excavation and rough grade the earth to the established grade line outside the foundation walls.



UNIT 3.0.0 BUILDING FOUNDATION MASONRY/CONCRETE WALLS

3.2.0 Basement Construction - Concrete Foundation Wall

GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

3.2.1 Employ a competent sub-contractor to excavate to a predetermined depth as indicated on the corner batter board stakes. The learner will check depths and serve as an assistant to the earth moving equipment operator.

3.2.2 Draw to scale a cross section view of a concrete foundation wall and footing recommended for use in the construction of a typical residence basement. Use Federal Housing Administration Minimum Property Standards as acceptable practice.

3.2.3 Name two techniques for preparing foundation wall and pier footing forms. Include materials, sizes and placement of form parts.

3.2.4 Layout and construct foundation wall footing forms and prepare earth footing forms by trenching into the soil to the specified width and depth.

3.2.5 Calculate the elevation for the top of the basement wall footing and the top of pier footings.

3.2.6 Locate and place leveling pins in the trenched footing forms at each wall intersection, spaced approximately eight feet on center and centered between the sides of the trench. Set leveling pin height by string or builders level.

3.2.7 List in writing the ingredients used to prepare concrete and the primary function of each.

3.2.8 Write the meaning of a concrete mix consistency of a "ratio of 1.2.4".

3.2.9 Calculate the cubic yards of concrete needed for the foundation footings.

3.2.10 Place and level 5 bag redi-mix concrete in foundation wall and pier footing forms.

3.2.11 Layout location on the footings for the alignment of prefabricated form panels.

3.2.12 Assemble outside prefabricated form panels for concrete wall.

3.2.13 Assemble inside prefabricated form panels for concrete wall.

3.2.14 Install wall spreaders between the inside and outside wall forms.

3.2.15 Tie inside and outside wall forms together using form ties.

3.2.16 Install wales to inside wall forms.

3.2.17 Align wall forms using stakes and braces.

3.2.18 Install forms for all openings in foundation walls.

3.2.19 Place 5 bag redi-mix concrete in basement wall forms.

NOTE: SPADE ALONG BOTH SIDES OF THE FORMS TO ELIMINATE HONEYCOMBING.

3.2.20 Install ½ inch anchor bolts in top of foundation wall spaced not more than four (4) feet apart.

3.2.21 After one (1) to two (2) days of curing, remove the wall forms and oil if necessary.

3.2.22 Layout and install ground water control system consisting of drain tile laid adjacent to the outside edge of the wall footing and a sump basin to allow water to collect for disposal by a pump.

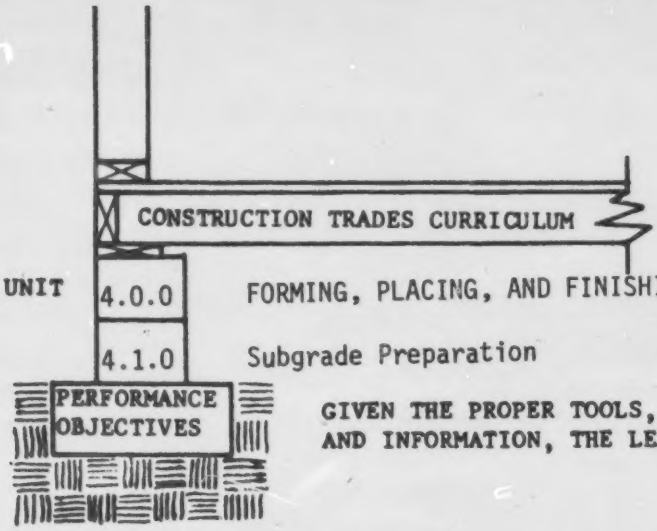
3.2.23 Waterproof basement walls below finished grade to specifications listed in the Federal Housing Administration Minimum Property Standards for One and Two Living Units.

3.2.24 Install pressed steel areaways for basement windows that are located below the finished grade.

3.2.25 Employ a competent sub-contractor to backfill and rough grade the excavation outside the basement walls after a minimum one (1) week curing period.

3.2.26 Locate public water main, layout location of trench to service access (in basement wall) excavate trench to depth required by local plumbing code, and employ sub-contractor to install water service and meter housing.

NOTE: WATER METER HOUSING INSTALLATIONS ARE COMPLETED BY CITY EMPLOYEES IN SOME COMMUNITIES. WATER AND SEWER TAPS ARE GENERALLY SUPERVISED OR PERFORMED BY WATER DEPARTMENT EMPLOYEES.



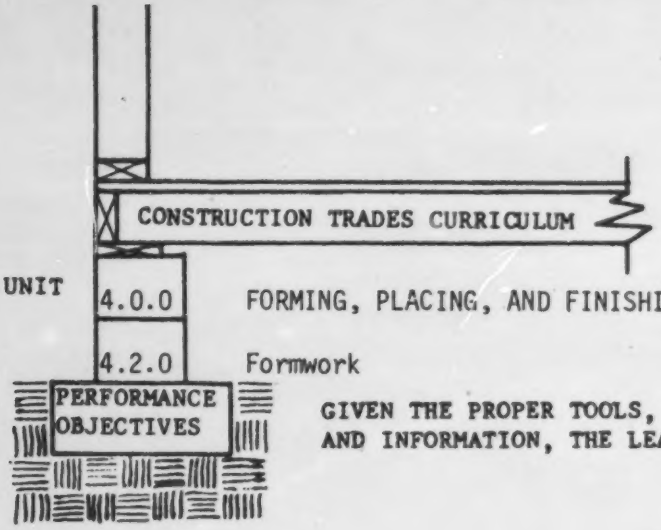
GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

4.1.1 Compact the supporting soil (subgrade) to a soil density equal to or greater than undisturbed soil.

4.1.2 List four (4) granular fills recommended to bring the subgrade to uniform bearing and final grade by the Portland Cement Association.

4.1.3 Identify three(3) methods that may be used to compact subgrades prior to forming and placing concrete.

4.1.4 State the correct condition of the subgrade in relation to moisture content immediately prior to placing concrete.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

4.2.1 Identify two (2) kinds of materials generally used for construction of forms for the purpose of placing concrete in a horizontal position.

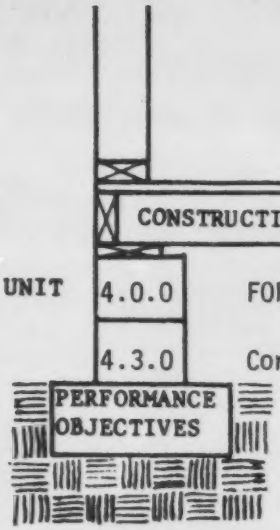
4.2.2 Set straight drive, walk, and patio side forms to the proper grade by use of a string line.

4.2.3 Stake and brace side forms to horizontal and vertical alignment.

4.2.4 List four (4) materials used to form horizontal curves in concrete form construction.

4.2.5 Construct horizontal curved concrete forms as specified by the Portland Cement Association.

4.2.6 Install premolded strips of isolation joint material as specified by the Portland Cement Association.



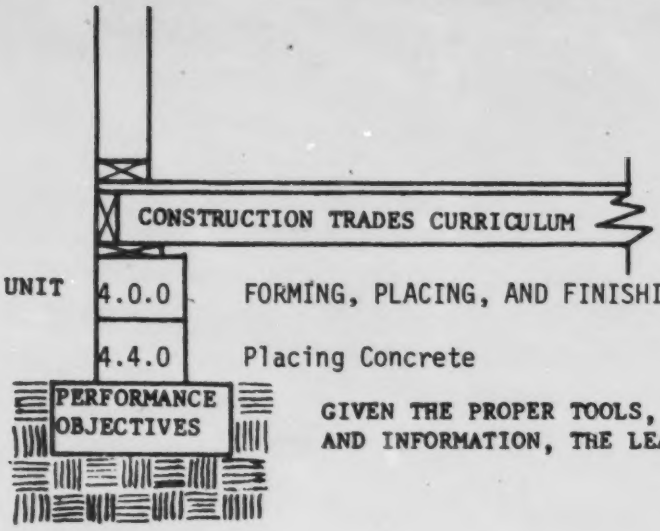
UNIT 4.0.0 FORMING, PLACING AND FINISHING CONCRETE - HORIZONTAL

4.3.0 Concrete Requirements

GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

4.3.1 Calculate the number of cubic yards of concrete needed for a specific driveway or walk. Add five (5) percent for losses due to uneven subgrade and spillage. Calculation must be accurate to two decimal places.

4.3.2 Write an order for the amount of concrete needed for the job outlined in objective 4.3.1. Specifications are to be listed relative to: (1) maximum size aggregate, (2) minimum cement content, (3) maximum slump, (4) compressive strength at twenty eight (28) days, and (5) air content.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

4.4.1 List eleven (11) essential items (tools and equipment) that must be ready and waiting at the job site where the concrete is delivered and ready for placement.

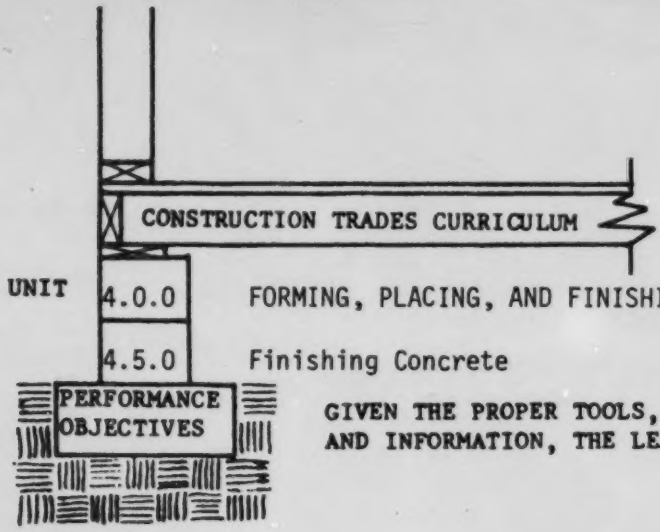
4.4.2 Develop a detailed sketch of plans for transporting concrete to a specific placement site from the redi-mix truck. Plan routing in reference to direct placement from chute, wheelbarrow, or bucket.

4.4.3 Place concrete uniformly to the full depth of the forms and as near as possible to the final position.

4.4.4 Spade concrete along forms for compaction and to eliminate the formation of voids and honeycomb.

4.4.5 Remove excessive concrete from within the form by bringing the surface to grade by strikeoff.

4.4.6 Level ridges and fill voids in concrete with a bull-float or darby immediately after completing the strikeoff.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

4.5.1 List five factors that control the length of the waiting period immediately preceeding the first finishing operation.

4.5.2 Cut concrete away from the forms before edging to a depth of one (1) inch immediately after floating.

4.5.3 Compact and harden the concrete surface next to the form into a rounded edge using an edging tool with a ½ inch radius when the concrete has firmed enough to hold the shape of the edge tool.

4.5.4 Compare three (3) kinds of control joints used in concrete walks, drives and patios. Include full scale sketches of each kind and complete detailed dimensions.

4.5.5 Layout and hand tool control joints in drive, walk, or patios as specified by Minimum Property Standards for One and Two Living Units.

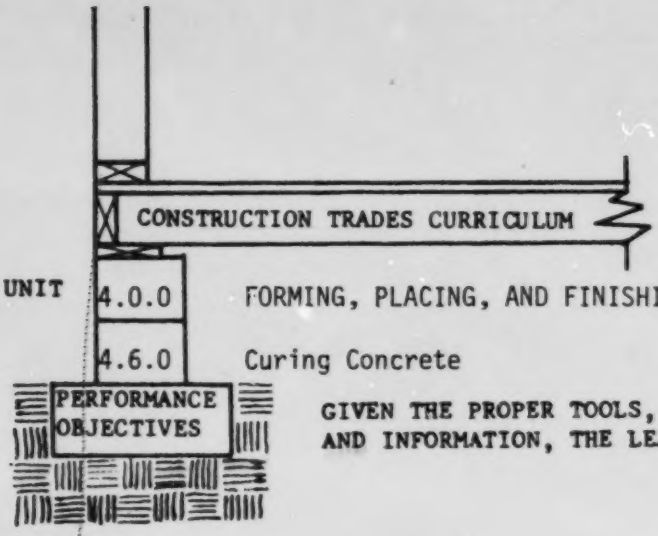
4.5.6 Explain in writing three (3) purposes for floating concrete.

4.5.7 Level the surface of concrete by floating using a hand operated float of a size adequate for the job.

4.5.8 Trowel the surface of concrete to a smooth, hard, dense surface.

NOTE: A SECOND OR THIRD TROWELING MAY BE NECESSARY TO INCREASE SMOOTHNESS AND HARDNESS.

4.5.9 Broom the surface of concrete to create an attractive textured nonslip surface.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

4.6.1 State, in writing, two conditions under which the curing process of hydration stops during the curing process.

4.6.2 Write three (3) acceptable methods of curing concrete.

4.6.3 Cover and seal fresh troweled concrete with 4 mil polyvinyl cover (sheeting).

4.6.4 Compare, in writing, the length of curing periods of concrete for 70 degrees F. or higher temperatures with temperatures from 50 to 70 degrees F.

4.6.5 List three ways the curing period of concrete may be reduced from seven (7) to three (3) days during cold weather periods.

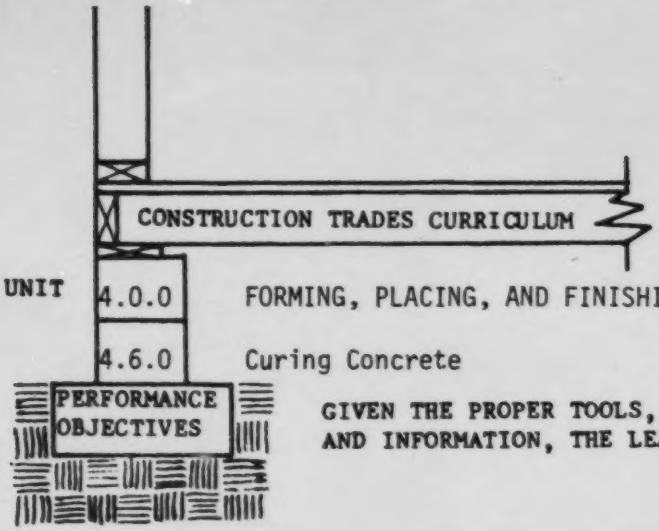
4.6.6 List five (5) ways to help prevent rapid loss of surface moisture from concrete during extremely hot and dry weather periods.

4.6.7 Identify one (1) likely damage to cured concrete surfaces resulting from the use of de-icers.

4.6.8 Define the term "air entrainment" in relation to a plastic concrete mix.

4.6.9 List three (3) advantages of air entrained concrete in the plastic state.

4.6.10 List three (3) advantages of air entrained concrete in the cured state.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

4.6.1 State, in writing, two conditions under which the curing process of hydration stops during the curing process.

4.6.2 Write three (3) acceptable methods of curing concrete.

4.6.3 Cover and seal fresh troweled concrete with 4 mil polyvinyl cover (sheeting).

4.6.4 Compare, in writing, the length of curing periods of concrete for 70 degrees F. or higher temperatures with temperatures from 50 to 70 degrees F.

4.6.5 List three ways the curing period of concrete may be reduced from seven (7) to three (3) days during cold weather periods.

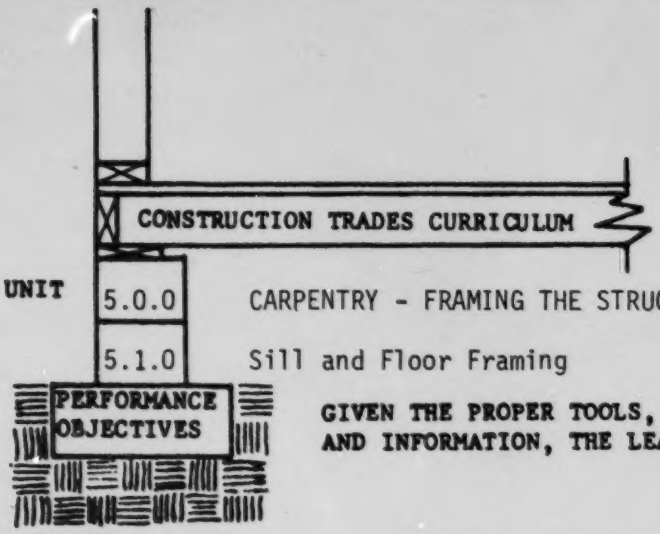
4.6.6 List five (5) ways to help prevent rapid loss of surface moisture from concrete during extremely hot and dry weather periods.

4.6.7 Identify one (1) likely damage to cured concrete surfaces resulting from the use of de-icers.

4.6.8 Define the term "air entrainment" in relation to a plastic concrete mix.

4.6.9 List three (3) advantages of air entrained concrete in the plastic state.

4.6.10 List three (3) advantages of air entrained concrete in the cured state.



CARPENTRY - FRAMING THE STRUCTURE

Sill and Floor Framing

GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

5.1.1 Differentiate between platform (western) and balloon framing by sketching three (3) basic differences in their framing techniques.

5.1.2 Calculate the maximum allowable span for floor joists of a particular species, grade, use, and spacing from span tables published by the National Forest Products Association.

5.1.3 Sketch and identify all floor and sill framing members.

5.1.4 Install/apply termite protection according to local building codes or HUD Minimum Property Standards.

5.1.5 Layout, cut, and fabricate (in place) a built-up wood girder.

NOTE: LAYOUT LINES ON LUMBER WILL BE ACCURATE WITHIN THE WIDTH OF A PENCIL (SHARP) LINE. TOLERANCES - ALL MEASUREMENTS ASSOCIATED WITH FRAMING ARE + 1/16 INCHES UNLESS OTHERWISE NOTED. A RELIABLE GENERAL GUIDE IS TO LEAVE THE PENCILED LINE WHEN CUTTING.

5.1.6 Layout, cut and pre-fit foundation sills to the top of foundation walls.

5.1.7 Layout and bore holes in foundation sills to facilitate fastening sills to foundation walls with anchor bolts (previously placed).

5.1.8 Layout and install sill sealer to foundation wall top.

5.1.9 Install sill over foundation anchor bolts and sill sealer.

5.1.10 Layout and mark position of each floor joist on the joist headers and girder.

5.1.11 Place header joists in position and toenail them to the foundation sill.

5.1.12 Place floor joists in position (with the crown up) and nail to joist header and together over girder if applicable.

5.1.13 Frame all openings in the floor system by maintaining accurate layout, cutting and installation of trimmer, header and tail joists.

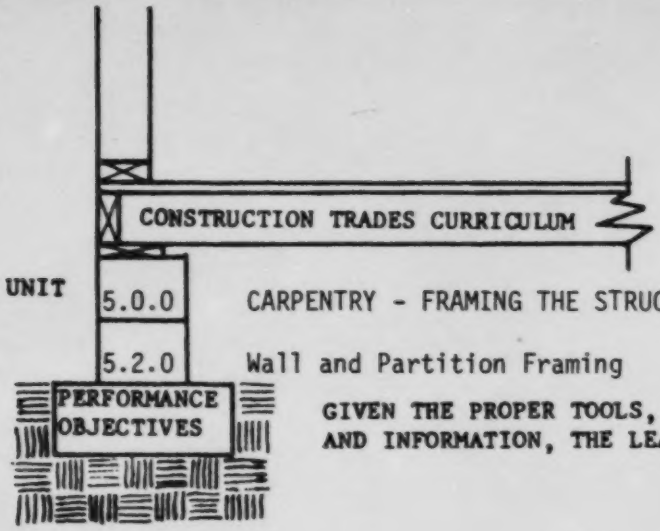
5.1.14 Describe three (3) kinds of bridging and write the purpose for which the use of bridging is intended.

5.1.15 Layout, cut and install wood cross bridging in a floor system. (Nail tops only.)

5.1.16 Write two (2) main purposes and list four (4) kinds of materials that may be used for the subfloor of a residential structure.

5.1.17 Layout, cut and install shiplap or common boards at a 45 degree angle with the floor joists.

5.1.18 Install plywood over floor joists spaced 16 inches on center with the long dimension of the sheets perpendicular to the joists and with joints "broken" in successive courses. Installation and specifications are to meet HUD Minimum Property Standards.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

5.2.1 Sketch and identify the framing members used in the assembly of vertical and horizontal members that form the exterior and interior walls of a residential structure. Include all members in one wall.

5.2.2. In a plan view sketch and indentify three (3) common types of corner construction.

5.2.3 In a plan view, sketch and identify two (2) methods of anchoring partition walls to outside walls (intersections).

5.2.4 Layout location of outside walls and mark on subfloor using chalk line.

5.2.5 Layout location of partition walls and mark on subfloor using chalk line.

5.2.6 Cut exterior sole and top plate to length, place in position on subfloor and lay off location of all framing members to be placed within the wall. Use standard indentification symbols.

5.2.7 Place sole and top plate in nailing and erection position.

5.2.8 Layout and cut wall studs (if not pre-cut), trimmers, cripples, and headers to length.

5.2.9 Fabricate corners, partition junctions ("T's") and headers according to local building code/HUD Minimum Property Standards, One and Two Family Dwelling, 1973.

5.2.10 Assemble exterior wall parts in a manner that will provide safe support of design loads as specified in HUD Minimum Property Standards, Manual of Acceptable Practices, 1973.

5.2.11 Erect exterior frame walls, plumb vertically (in two directions) and secure by temporary bracing and nailing through sole plate into header/band joist.

5.2.12 Install bracing to exterior walls to resist lateral stresses when necessary. The learner will ascertain the conditions under which exterior wall bracing is unnecessary.

5.2.13 Layout, cut, fabricate and install all partition walls to a plum position.

NOTE: IF TRUSS ROOF SYSTEM IS USED, THE FABRICATION AND INSTALLATION OF PARTITION WALLS MAY BE DELAYED UNTIL THE ROOF STRUCTURE IS FRAMED AND WATER TIGHT.

5.2.14 Layout, cut, and frame special purpose wall and floor openings as specified by drawings, (stair, furnace, air conditioner, recessed cabinet openings).

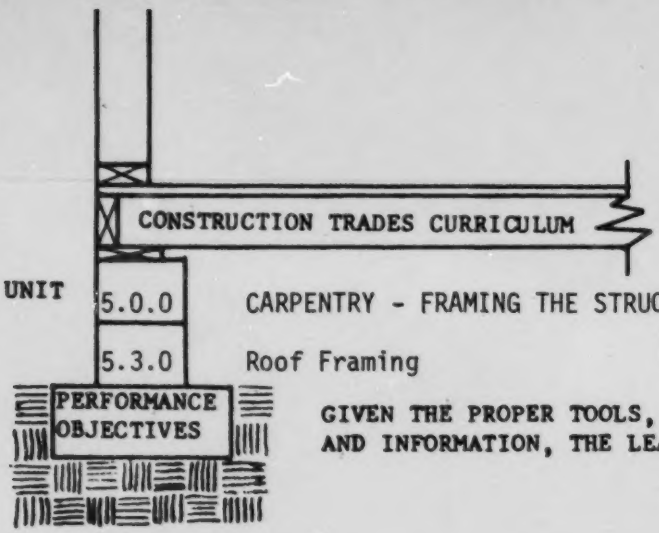
5.2.15 List five (5) materials/products generally used for wall sheathing purposes and write a primary advantage and disadvantage of each.

5.2.16 Compare five (5) commonly used sheathing materials by writing application techniques and procedures for each. Compare characteristics of size, lateral bracing value, application position, nailing details (spacing and size), and application techniques characteristic of each.

5.2.17 Install exterior wall sheathing according to accepted and efficient construction practices.

5.2.18 Calculate the maximum allowable span for ceiling joists of a particular species, grade, use, and spacing from span tables published by the National Forest Products Association.

5.2.19 Layout, cut, and install ceiling joists if truss roof construction is not used.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

5.3.1 Sketch, in pictorial fashion, and identify seven (7) types of roofs used in residential construction.

5.3.2 Sketch a composite plan view of a roof and identify six (6) kinds of roof rafters. Include ridges, and gables as needed.

5.3.3 Sketch in pictorial form all parts of a common rafter and identify each part by label.

5.3.4 Define the roof framing terms span, run, rise, ridge, rafter length, slope, and pitch in writing.

5.3.5 Lay off rafter locations on top and edge of exterior wall plates and on both faces of the ridge board.

5.3.6 Layout, cut, and erect common rafters and ridge board.

5.3.7 Layout, cut, and fit gable end studs if applicable.

> NOTE: AN ALTERNATE PROCEDURE IS TO FRAME THE COMPLETE GABLE END RAFTERS AND STUDS AS ONE OR TWO UNITS.

5.3.8 Layout, cut, and install horizontal framing members over and at right angles to the gable if an extended roof rake (gable overhang) is included in the architectural plans.

> NOTE: GABLE END HEIGHT IS REDUCED BY AN AMOUNT EQUAL TO THE WIDTH OF THE ROOF RAFTERS MEASURED AT RIGHT ANGLES TO THE PLANE IN WHICH THE ROOF RAFTERS LAY.

5.3.9 Layout, cut, and install hip and valley rafters if applicable to the roof design.

5.3.10 Layout, cut, and install hip jack rafters.

5.3.11 Layout, cut, and install valley jack rafters.

5.3.12 Layout, cut and install cripple jack rafters.

5.3.13 Layout, cut and fit fascia to rafter tails and rake on gable ends when applicable.

5.3.14 Layout, cut, and fabricate the standard W (Fink) truss commonly used in residential construction. The truss will be built from engineering data provided by the University of Illinois Small Homes Councils "Nail-Glued "W" Roof Truss, 2" X 4" Truss, 2' on Center, 20'-8" to 28'-8" Spans, 4/12 Slope".

5.3.15 List three (3) roof sheathing materials/products generally used and write a primary advantage and disadvantage of each.

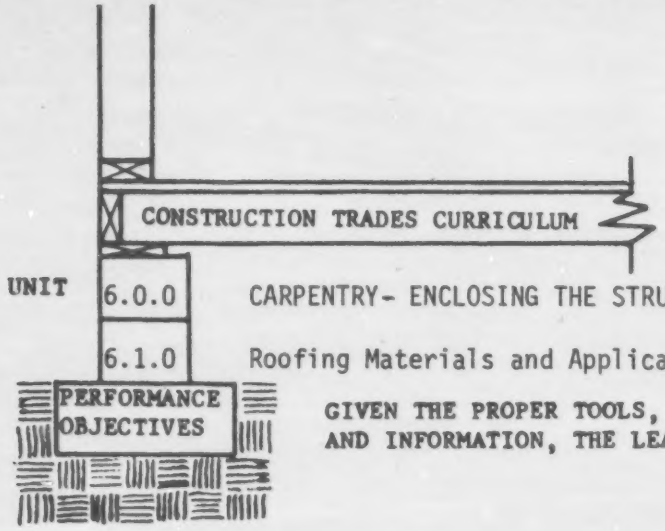
5.3.16 Compare three (3) commonly used roof sheathing materials/products by writing application techniques and procedures for each. Compare characteristics of size, bracing value, application techniques characteristic of each.

5.3.17 Calculate the amount (net free area) of attic ventilation needed as specified by HUD Minimum Property Standards for One and Two Family Dwellings for a 1500 sq. ft. single story residential structure.

5.3.18 Install roof sheathing according to local building codes or HUD Minimum Property Standard construction practices.

NOTE: REMEMBER TO LEAVE A CONTINUOUS OPENING IN THE SHEATHING AT THE RIDGE IF ATTIC VENTILATION REQUIREMENTS ARE MET BY USE OF RIDGE VENTILATION. SEE VENTILATOR RIDGE INSTALLATION INSTRUCTIONS.

5.3.19 Layout, cut, and fit finish trim (corner or plain molding) to gable end roof rakes.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

6.1.1 In writing define the roofing terms: square, coverage, exposure, head lap, side lap, and shingle butt.

6.1.2 List four (4) of non-sheet materials generally applied to sloping roofs in residential construction.

6.1.3 Write four (4) kinds of sheet materials that are available for roofing residential structures.

6.1.4 Install galvanized drip edge to eaves and rakes of a roof.

6.1.5 Apply asphalt-saturated felt (15 lb. roofers felt) to roof deck as specified by the Asphalt Roofing Manufacturers Association.

6.1.6 Install open type valley flashings to valley intersections of roofs prior to asphalt shingle installation.

6.1.7 Install flashings to woven and closed-cut valley intersections of roofs prior to asphalt shingle installation.

6.1.8 Install metal flashing shingles between sloping roof and vertical wall as specified by the Asphalt Roofing Manufacturers Association.

6.1.9 Install roof flashings around chimneys, heater and ventilation vents, and plumbing vents (stacks) as specified by the Asphalt Roofing Manufacturers Association.

6.1.10 Install starter strip beginning at the roof eave.

NOTE: STRIP SHINGLES MAY BE USED AS A STARTER STRIP BY INSTALLING THEM IN AN INVERTED POSITION.

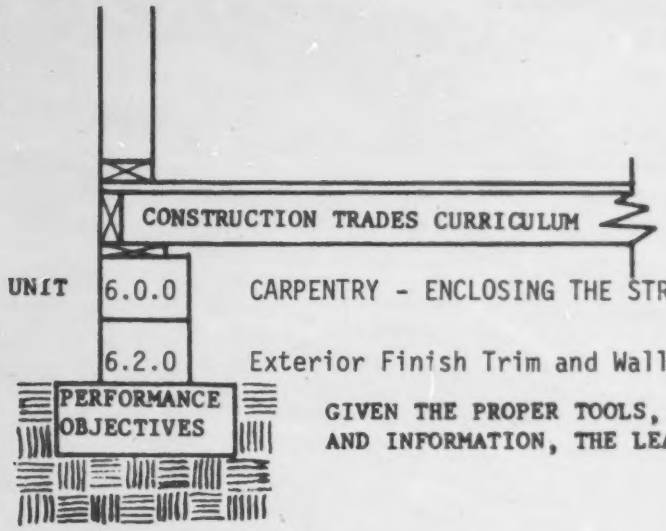
6.1.11 Install three tab square butt asphalt shingles with cutouts centered over the tabs in the course directly below.

NOTE: ALTERNATE PATTERNS MAY BE DEVELOPED DEPENDING UPON THE TYPE OF SHINGLE.

6.1.12 Install hip and ridge asphalt shingles to complete the coverage at roof intersections over ridge and hip rafters.

NOTE: RIDGE SHINGLES MAY BE MADE BY CUTTING STRIP SHINGLES INTO THREE EQUAL LENGTHS OF 12 INCHES.

6.1.13 Install ridge attic ventilators in place of ridge shingles when specified on the architectural drawings.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

6.2.1 Sketch a section view of a typical cornice construction with the following parts and specifications: roof slope of 4/12; parts consisting of exterior wall stud, wall sheathing, ledge, lookout, frieze, fascia, plancier (soffit) rafter, shingles, roof sheathing, and ceiling joist.
Label each part.

6.2.2 Name three cornice designs generally used in connection with the construction of wide roof overhangs. Compare three types of soffit (plancier) construction.

6.2.3 Layout, cut and install framing parts of ledger and lookouts in preparation for the construction of a horizontal box cornice.

NOTE: OMIT IF ARCHITECTURAL PLANS CALL FOR AN OPEN CORNICE.

6.2.4 Install horizontal covering to underside of cornice lookouts.

6.2.5 Construct the rake section at the end of the roof over the gable to match the cornice.

6.2.6 Install covering to the underside of the rake overhang.

6.2.7 Install frieze to intersection of exterior wall and soffit.

NOTE: THE FRIEZE IS SOMETIMES SUBSTITUTED ON CONTEMPORARY STRUCTURES BY THE USE OF A MOLDING PLACED AT THE INTERSECTION OF THE EXTERIOR SIDING AND THE SOFFIT.

6.2.8 Calculate the number and size of soffit and gable ventilators necessary to meet or exceed the attic ventilation needs as specified by HUD Minimum Property Standards for One and Two Family Dwellings and install.

NOTE: REMEMBER SOFFIT VENTILATION SERVES AS A PORTION OF THE TOTAL ATTIC VENTILATION SYSTEM.

6.2.9 Classify windows under three (3) basic headings and write the name and description of one window type for each classification.

6.2.10 List four (4) ways in which window sizes are generally placed in manufacturers catalogues.

6.2.11 Place windows in previously framed rough openings, wedge sill to correct height and to level position, plumb side jambs and nail through side and top casings into the building frame.

NOTE: INSTALL WINDOWS WITH SASHES IN CLOSED POSITION AND DIAGONAL BRACES OR SPACER STRIPS INTACT.

6.2.12 Specify the minimum height and width of exterior entrance and rear service doors as indicated in HUD Minimum Property Standards.

6.2.13 Compare the construction characteristics of three (3) commonly used exterior door units; (1) panel, (2) flush, (3) metal clad. List one advantage and disadvantage of each.

6.2.14 Place preconstructed exterior door units in framed openings, shim side jambs to plumb position and nail through side and top casings into the building frame.

6.2.15 Layout, cut and install garage door jambs and exterior casings.

6.2.16 Execute nine (9) major steps to complete a sectional roll up garage door installation.

NOTE: MANUFACTURERS SUPPLY DETAILED DIRECTIONS AND PROCEDURES FOR THE INSTALLATION OF THEIR PARTICULAR PRODUCTS. FOLLOW THESE STEPS CAREFULLY.

6.2.17 Apply a primer coat of paint to all exterior trim and doors, where applicable, as soon as practical to provide protection from the elements.

NOTE: MANY PRODUCTS PRIMED DURING THE MANUFACTURING PROCESS DO NOT NEED A PRIMER COAT APPLICATION.

6.2.18 Sketch the end view of five (5) types of horizontal siding and label each.

6.2.19 Sketch the end view of four(4) methods of applying board and batten exterior wall coverings. Label each.

6.2.20 Name five (5) plywood siding styles available as exterior wall coverings and describe each by sketch.

6.2.21 List five (5) additional products generally used as exterior wall coverings.

6.2.22 Layout, cut, and apply horizontal siding.

6.2.23 Layout, cut, and apply vertical siding panels.

6.2.24 Sketch and label five (5) brick bonds commonly used.

6.2.25 Layout exterior wall in preparation for installation of brick by establishi.g head joint location and allowance for mortar joints by stringing out (placing) the first course of brick without mortar. Adjust for minimum cutting by varying width of head joints.

6.2.26 Layout vertical position of all brick courses and mortar joints on a story pole. Anticipate slight vertical adjustments in thickness of motar joint to compensate for door and window sill placement.

6.2.27 Repeat task 3.1.15. Measure and mix mortar ingredients until the mortar is uniform, cohesive and of a consistency that makes it usable.

6.2.28 Add coloring to mortar as per specifications on container.

6.2.29 Load a masonry trowel and spread mortar on masonry units (brick) until the fundamental steps have been acquired. (See next task.)

6.2.30 Build a lead about six courses high at each corner to establish proper height and provide a place to attach the mason's line.

NOTE: THE HEIGHT OF EACH COURSE IS DETERMINED BY A MASON'S RULE OR STORY POLE WITH HEIGHT MARKS ON IT.

6.2.31 Tool vertical and horizontal mortar joints when the mortar has become "thumb print hard" or when the mortar is compacted.

6.2.32 Layout and cut line brick to specified lengths within a tolerance of $\pm$ 1/8 inch.

6.2.33 Lay stretcher bricks from both leads to the center using a taut line as a guide.

6.2.34 Place metal ties in mortar joints and affix to frame of the structure.

6.2.35 Layout, cut and install end caps and outlet tubes to metal guttering sections before installation to fascia.

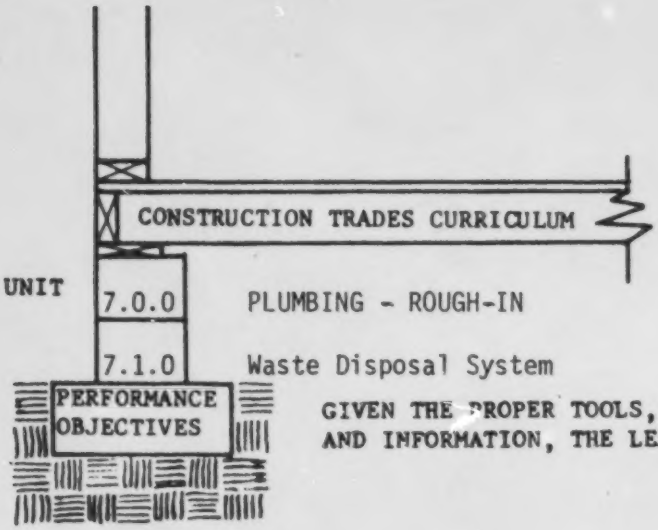
6.2.36 Install guttering sections to fascia using hangers or spike and ferrule system of attachment.

NOTE: NAIL SPIKE INTO END OF ROOF RAFTER IF FASCIA IS MADE OF 3/4 INCH THICK MATERIAL.

6.2.37 Layout and cut down spouts to length and trial fit to structure using appropriate elbows.

6.2.38 Fasten down spouts to structure with a minimum of two straps placed near the top and bottom portions of the downspout directly adjacent to the exterior wall of the structure.

NOTE: AVOID EXTRA LONG LENGTHS OF GUTTERING (OVER 30 FEET) BECAUSE OF POSSIBLE RUPTURE FROM EXCESSIVE EXPANSION AND CONTRACTION OF METALS.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

7.1.1 Write the names of the four (4) main parts of a waste disposal system and explain the function of each.

7.1.2 List the size requirements for the four (4) main parts of a waste disposal system as specified by the local or National Plumbing Code.

7.1.3 Write a minimum of six (6) pipe products generally used for drainage and ventilation requirements of residential plumbing installations.

7.1.4 List six (6) plumbing fixtures generally included in single family residences and the soil or waste pipe sizes (diameters) considered minimum as specified by the National Plumbing Code or HUD Minimum Property Standards.

7.1.5 Layout the location of all fixtures requiring soil or waste connections.

NOTE: LABEL USING A HEAVY LINE MARKER FOR EASY IDENTIFICATION.

7.1.6 Layout the location of all vents as required by the local/ National Plumbing Code and label.

7.1.7 Join rigid copper drainage pipe and fittings using solder to make a watertight joint.

7.1.8 Join cast iron soil pipe to fittings using neoprene gaskets.

NOTE: LEAD-OAKUM JOINTS ARE GROWING OUT OF FAVOR BECAUSE OF SIMPLER AND MORE RAPID METHODS OF INSTALLATING WASTE AND SOIL DISPOSAL PIPING.

7.1.9 Join plastic drainage pipe PVC (polyvinyl chloride/polyvinyl dichloride) or ABS (acrylonitrile butadine styrene) into water-tight joints using a chemical to construct a solvent-welded joint.

7.1.10 Cut or bore and frame the necessary openings in walls, floors, ceilings and roof for soil, waste and vent pipe installations. Ascertain opening sizes and hole diameters from drainage pipe measurements.

7.1.11 Install bath tub or combination shower and bath tub unit according to instructions furnished with unit.

7.1.12 Select pipe to be used from the plumbing plans for the waste disposal system. Layout, cut and join pipes and fittings to form the soil stack and vent. Assemble in place and extend through ceiling and roof.

7.1.13 Complete soil installation for water closets by connecting closet floor flange to soil pipe and extending soil drain pipe to T previously placed in main soil stack.

7.1.14 Complete connection of waste installations to main soil stack from all other fixtures producing liquid waste water. Include P-traps and cleanouts as specified by local or National Plumbing Code.

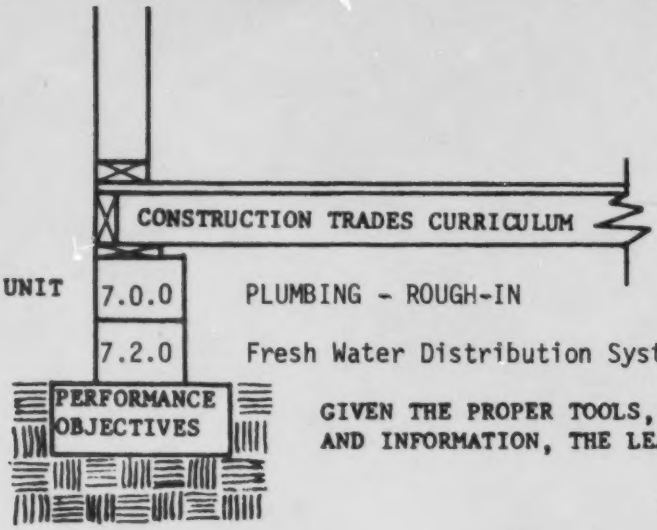
7.1.15 Vent each plumbing fixture through the roof as specified by the local plumbing code/National Plumbing Code or HUD minimum Property Standards.

7.1.16 Extend the house drain from the base of the main soil stack through the exterior foundation wall the specified distance below grade.

7.1.17 List four kinds of pipe generally used for sewer installations between a residential structure and the community sewer or septic tank. Specify the type of connecting joint used with each.

7.1.18 Excavate a trench and install the house sewer from the house drain (extending through the foundation wall) to the community sewer line or septic tank.

7.1.19 Explain in writing how a plumber would conduct a water, air and smoke test for a waste disposal system.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

7.2.1 List minimum size water supply pipes for fixtures generally installed in residential structures. Include bathtubs, laundry tub, dishwasher, kitchen sink, lavatory, shower, service sink, water closet (tank type), hose bibbs and water heater.

7.2.2 List three (3) kinds of pipe generally used in the construction of cold water distribution systems including <u>one</u> advantage and disadvantage of each.

7.2.3 Join rigid type L copper water supply pipes and fittings using solder to construct a water tight joint.

7.2.4 Join galvanized iron water supply pipes and fittings by cutting an American Standard taper pipe thread and joining to construct a water tight joint.

7.2.5 Join plastic water supply pipes and fittings using a chemical to construct a solvent welded water tight joint.

7.2.6 Write three (3) -- criteria that must be observed when planning the location of the exterior water service line to a residential structure.

7.2.7 Layout and excavate a trench to specified depth and install water service supply line.

7.2.8 Layout and bore holes for all water supply pipes at fixture locations.

7.2.9 Install all fixture fittings (usually tub and shower) in place that are covered by the interior wall coverings and extend water supply risers through the floor for connection to the water supply main via branch lines.

7.2.10 Fabricate and secure in position all concealed (within walls) water supply risers that service fixtures with trim not concealed within the wall. Extend water supply risers through the floor for connection to the water supply main via branch lines.

NOTE: THE INSTALLATION OF A WATER SERVICE SUPPLY LINE TO THE STRUCTURE HAS PREVIOUSLY BEEN LISTED AS PERFORMANCE OBJECTIVE 3.1.8 LOCATED IN UNIT III BECAUSE OF THE NEED FOR WATER EARLY IN THE CONSTRUCTION PROCESS.

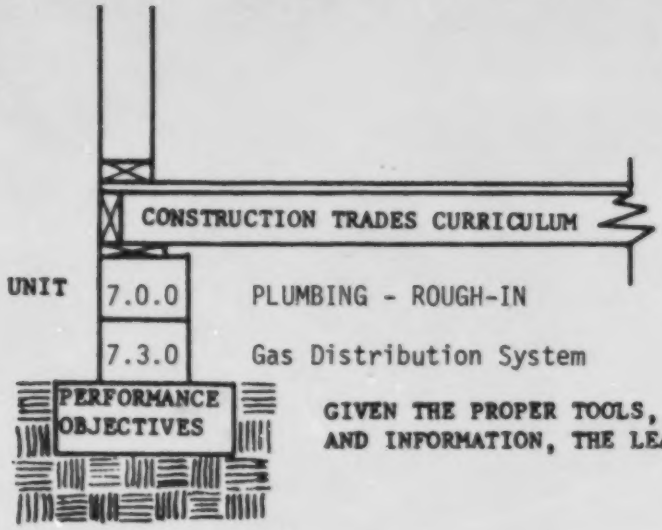
7.2.11 Install a 3/4 inch diameter cold water supply main suspended below the first floor. Extend the main sufficient distance to install branch lines to each fixture using cold water.

7.2.12 Install cold water branch lines to previously installed risers at each fixture location.

7.2.13 Install the water distribution system on a slight grade to facilitate gravity draining by placing a drain valve at the low point in the system.

7.2.14 Install a hot water supply main, 3/4 inches in diameter, suspended below the first floor joist. Begin the main at the hot water heater outlet and extend the main far enough to facilitate the installation of branch hot water lines to each consuming fixture.

7.2.15 Install hot water branch lines to previously installed risers at each fixture location.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

7.3.1 Write the primary reason why natural gas is generally transported in black steel pipe rather than galvanized steel pipe and one reason for piping manufactured gas in copper pipe or tubing.

7.3.2 Layout, cut, assemble and install a one (1) inch diameter gas pipe main and fittings suspended below the first floor. Begin the main outside the structure at the gas meter location and extend a sufficient distance to permit installation of branch lines and risers to each consuming fixture. Installation and piping shall be in accordance with local code or HUD Minimum Property Standards.

NOTE: SOME UTILITY COMPANIES REQUIRE AN INSIDE GAS METER INSTALLATION.

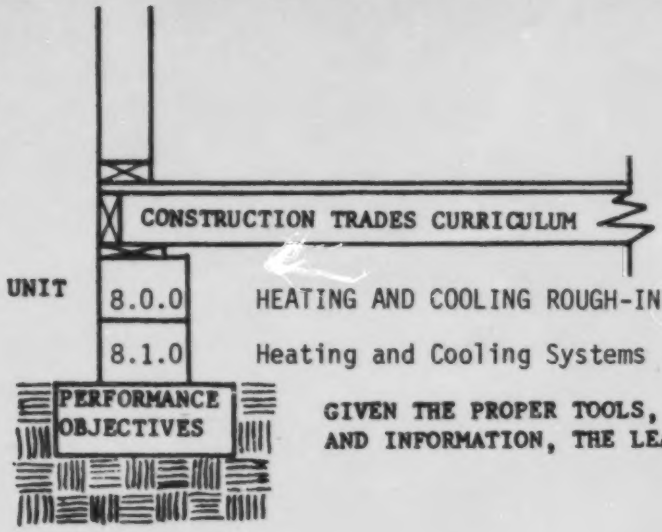
7.3.3 Layout, cut and install branch lines and risers, if necessary, to the furnace, water heater, clothes drier, kitchen range, outdoor cooking grill, gas lights, and refrigeration units when applicable. Install according to local codes or HUD Minimum Property Standards.

7.3.4 Cap each branch line in the general location of the consuming units and prepare the service end, usually outside the structure, with the necessary fittings to accommodate the gas meter installation. Observe local code or HUD Minimum Property Standard.

7.3.5 Contact utility company for meter installation specifications and gas service application and installation procedures.

NOTE: MOST UTILITY COMPANIES PROVIDE THE GAS SERVICE AND METER INSTALLATION AT MINIMAL OR NO CHARGE.

7.3.6 After gas service and meter installation, test all joints for possible leaks.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

8.1.1 Write a definition of conduction, convection and radiation and apply one practical example of each heat transfer principle.

8.1.2 Identify three (3) fuels that have been available in the recent past that produce heat for forced air furnace systems.

8.1.3 Sketch a plan view of three (3) kinds of forced air heating systems. Label each.

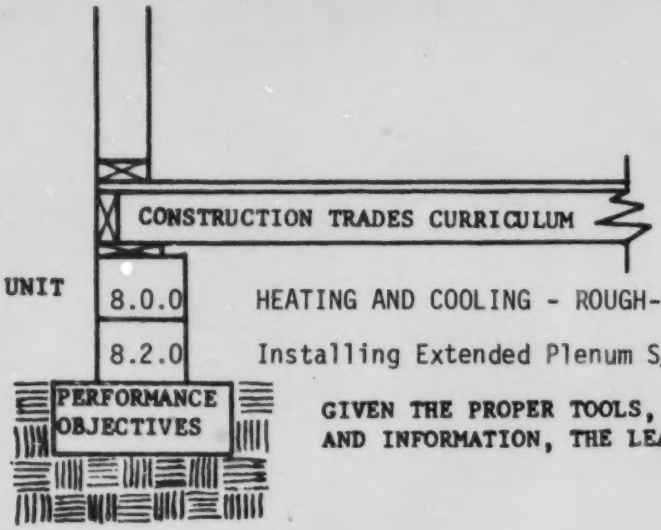
8.1.4 Compare two basic types of forced hot water heating systems generally used for residential heating by explaining their primary water flow cycles.

8.1.5 Write five (5) kinds of electric heating systems available for heating the residential structure and three (3) advantages and disadvantages of each.

8.1.6 Write a definition of compressor, condenser, expansion device and evaporator (cooling coil) as related to cooling systems designed for the residential structure.

8.1.7 Name three (3) basic types of equipment used to cool residential structures. Sketch and label a single diagram explaining how each functions.

8.1.8 List two types of distrubution systems that may be used to cool residential structures.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

8.2.1 Submit architectural plans to local building supply companies and request an engineered heating and cooling layout including a cost figure for a packaged delivered price to the site.

8.2.2 Layout and cut holes for register boots in each room.

8.2.3 Install boots in each opening and attach in place temporarily.

8.2.4 Assemble pre-packaged warm air plenum and install directly under the location of the counterflow furnace.

NOTE: SOMETIMES GARAGE LOCATIONS HAVE PREVIOUSLY PREPARED WARM AIR PLENUMS CONSTRUCTED OF CONCRETE OR MASONRY BLOCKS LINED WITH A SPECIAL INSULATING MATERIAL.

8.2.5 Layout, cut and install a starting collar in the side or sides of the plenum to connect the rectangular ducts to the plenum.

8.2.6 Assemble snap lock type rectangular ducts.

8.2.7 Layout, cut and install take-offs in rectangular duct sections.

NOTE: TAKE-OFFS FORM THE CONNECTING PLACE FOR ROUND PIPE RUNS TO EACH ROOM.

8.2.8 Extend the plenum by connecting one rectangular duct to the starting collar and strapping to the underside of the floor joists.

8.2.9 Lock rectangular duct sections together using drive clips.

8.2.10 Continue installation of extended plenum sections with take offs installed until the farthest register boots may be conveniently reached.

8.2.11 Install end cap in the end of the last section of the extended plenum.

8.2.12 Assemble snap lock type round pipes used for supply air.

8.2.13 Install 90^{o} adjustable elbows when needed in supply air pipes to individual rooms.

8.2.14 Install dampers in round supply air pipes nearest extended plenum.

8.2.15 Connect take offs at extended plenum to register boots located on or near exterior walls using round pipe sections.

8.2.16 Secure round pipe runs to floor joists with universal pipe hanger or galvanized fine wire.

8.2.17 Tape all joints in sheet metal connections using 2 inch wide duct tape.

8.2.18 Insulate pipe and extended plenum if crawl space perimeter is uninsulated.

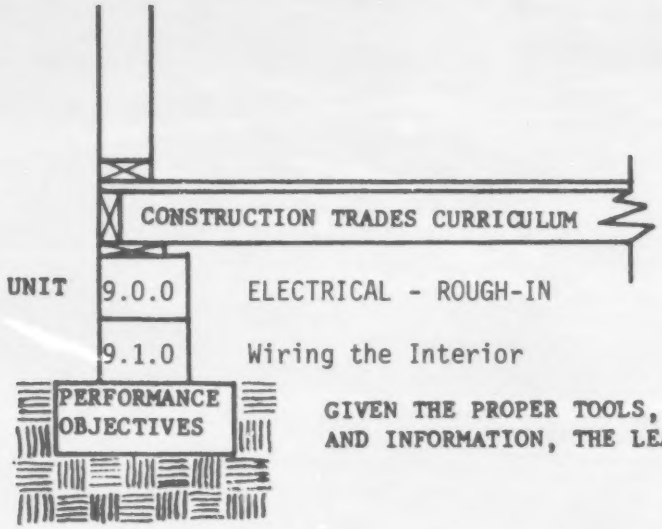
8.2.19 Install return air system to furnace location using either an insulated round pipe attic system or a dropped hall ceiling return air system or a combination of both.

NOTE: A LOWERED HALL CEILING GENERALLY PERMITS EASY ACCESS TO ALL ROOMS FOR PLACEMENT OF RETURN AIR GRILLS OVER THE ENTRANCE DOOR TO EACH ROOM.

8.2.20 Establish thermostat location and install low voltage wiring from furnace location to thermostat location.

NOTE: CONTRARY TO MANY MANUFACTURER SUGGESTIONS, LOCATION OF THE THERMOSTAT SHOULD BE AT A HEIGHT OF 2½ TO 4 FEET ABOVE THE FLOOR.

8.2.21 Locate and install a pre-fabricated fireplace by following detailed manufactures instructions.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

9.1.1 Acquire a copy (booklet) of the local municipal electric code that prescribes installation specifications for residential structures.

> NOTE: CALL, WRITE OR VISIT YOUR LOCAL BUILDING INSPECTORS OFFICE FOR SERVICE.

9.1.2 Obtain a copy of the National Electric Code in the event local electric codes are non-existent or a copy of wiring specifications in HUD Minimum Property Standards.

9.1.3 Write a definition of the following special terms used in the electrical industry.

ampacity	neutral
ampere	outlet
circuit	receptacle
circuit breaker	receptacle outlet
conductors	resistance
fuse	service disconnect
ground	service equipment
ground fault	short circuit
ground-fault circuit interrupter (GFCI)	switch
grounding	volt
kilowatt-hour (Kwh)	voltage drop
line conductor	watt

9.1.4 Name three (3) kinds of electrical conductors generally used to transport electrical current within residential structures.

9.1.5 Write the current-carrying capacity (in amperes) for the following wire sizes with rubber or plastic insulation in conduit or cable: #14, 12, 10, 8, 6, 4, 2, 1, 2/0, and 4/0.

9.1.6 On an existing architectural plan, draw a complete electrical plan using electrical symbols.

9.1.7 Develop a complete materials list for all electrical rough-in needs. Submit to electrical supply firms for bids.

9.1.8 On top of the existing electrical plan, layout each branch circuit in colored pencil.

NOTE: BE SURE TO OBSERVE THE NUMBER OF OUTLETS PER CIRCUIT AS SPECIFIED IN THE LOCAL/NATIONAL BUILDING CODE.

9.1.9 Locate and install the main distribution panel housing the disconnect (may be referred to as a power or load center) as specified by the local/national electric code.

9.1.10 Locate and install wall and ceiling outlet boxes for 120 volt, 20 amp. lighting circuits.

9.1.11 Locate and install wall outlet boxes for special appliance circuits of 120 volts that feed only one outlet box because of high wattage ratings.

9.1.12 Locate and install wall outlet boxes for single individual permanent appliances that consume 120 or 240 volts.

9.1.13 Locate and install recessed wall and ceiling electrical units (fans, etc.).

9.1.14 Install thin wall conduit according to local/national electric code.

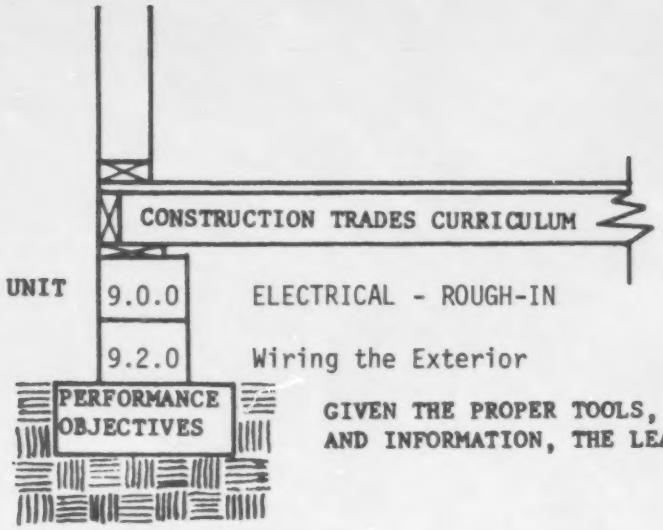
9.1.15 Bore holes for wire path and rough-in all branch circuit conductors.

NOTE: LABEL EACH CIRCUIT AT DISTRIBUTION PANEL.

9.1.16 Locate and rough-in low voltage circuit conductors for the doorbell and heating and cooling system controls.

9.1.17 Locate low voltage transformer for doorbell circuits.

9.1.18 Locate and rough-in conductors for television, telephone, and intercommunications systems.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

9.2.1 Contact the local utility company and request the service installation specifications for a 100, 150, and 200 amp. underground and overhead electrical installation.

9.2.2 Locate and install a meter socket for the size electrical entrance planned. (Locate after exterior wall covering is applied if possible.)

NOTE: METER SOCKETS ARE GENERALLY PROVIDED BY THE UTILITY COMPANY.

9.2.3 Layout, cut and install entrance conduit and fittings to the top of the meter socket and extend above roof line by specified distance.

9.2.4 Install service entrance conductors through top of conduit and secure to top terminals in meter socket.

9.2.5 Connect bottom terminals of meter socket to conductor and extend to distribution panel.

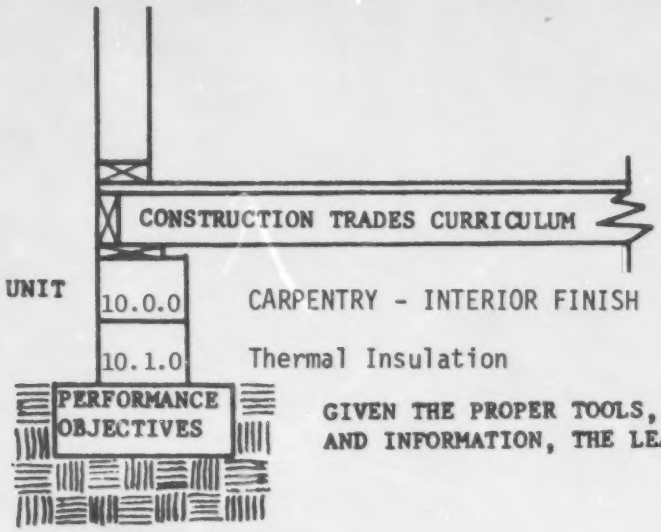
9.2.6 Provide a service ground for the electrical system as specified by local/national electric code.

9.2.7 Connect entrance conductors to disconnect terminals at distribution panel.

9.2.8 Install ground-interrupter for all garage and exterior outlets.

9.2.9 Excavate and bury underground conductor for exterior yard lights or service to other locations.

9.2.10 Request service company to install service drops to activate electrical service to the main disconnect.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

10.1.1 Write a definition of three (3) heat transfer principles and explain how thermal insulation materials tend to reduce heat transfer.

10.1.2 Write a definition of insulation that includes energy in the form of heat, sound or electricity.

10.1.3 Differentiate between four (4) general classes of insulation by writing a general descriptive statement of each: (1) flexible, (2) loose fill, (3) reflective and (4) rigid.

10.1.4 Write a definition of the following thermal terms: "BTU", "k", "C", "R", and "U".

10.1.5 Compare the insulation comfort levels established by the National Forest Products Association by listing the three compfort levels and the "U" and "R" factors for ceilings, walls, and floors over unheated spaces.

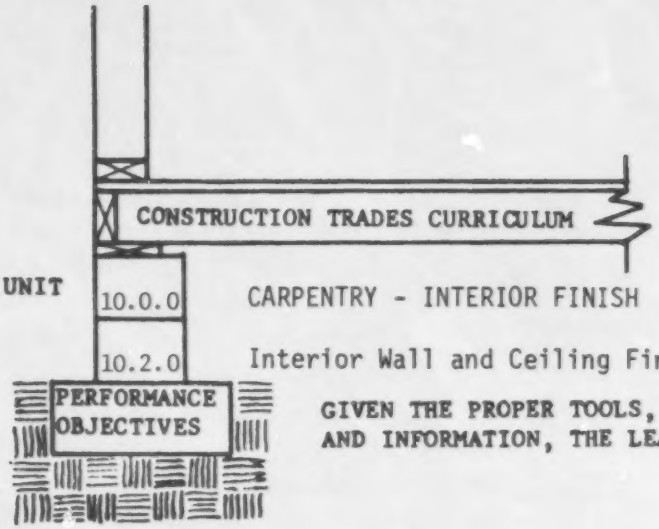
10.1.6 Install flexible batt type insulation in outside walls and ceilings over heated spaces.

10.1.7 Install loose fill insulation to exterior walls and ceiling after interior wall coverings have been applied by blowing into place using appropriate mechanical devices.

NOTE: SPECIAL MACHINES DESIGNED TO BLOW LOOSE INSULATION IN WALLS, CEILINGS OR FLOORS MAY BE RENTED OR SOMETIMES AVAILABLE ON LOAN FROM THE INSULATION SUPPLIER.

10.1.8 Install 2 or 4 mil polyethylene film to inside of exterior walls and ceilings to prevent moisture movement from the interior to the exterior.

NOTE: FLOOR INSULATION MUST BE DELAYED UNTIL ALL MECHANICAL INSTALLATIONS ARE COMPLETE.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

10.2.1 List five (5) kinds of interior wall covering products generally used by residential construction designers.

10.2.2 Name the two principle types of interior wall coverings used in residential construction and three advantages of each.

10.2.3 Write the standard gypsum wallboard sizes generally available.

10.2.4 Layout, cut, and install gypsum board to ceiling and walls of structure, observing application techniques that result in the highest strength wall surface with minimum resistance to cracking.

10.2.5 Smooth joints between gypsum wallboard panels by applying joint cement, perforated tape, additional coats of joint cement, and a final sanding level with ceiling or wall surface.

10.2.6 Install prefinished plywood/hardboard/fiberboard paneling to interior wall surfaces. Install directly to wall studs or on furring strips previously positioned. Application may be completed with the use of nails, cement or staples.

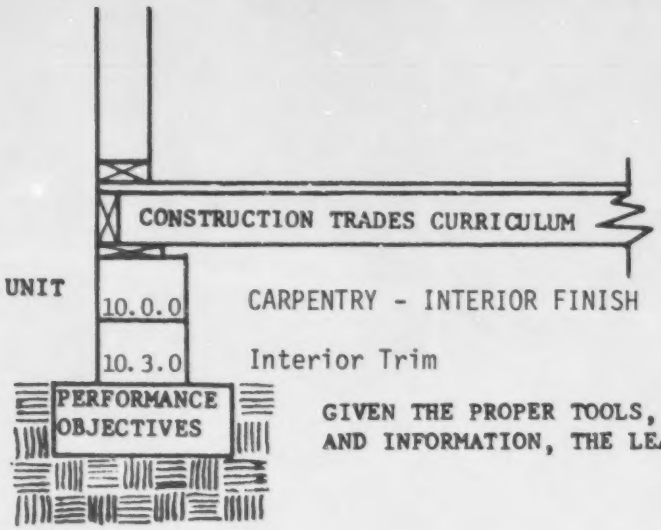
10.2.7 Prime the ceilings and wall surfaces with one coat of a primer paint recommended by a local paint store or information provided by the Painting and Decorating Contractors of America.

10.2.8 Employ a reputable gypsum board finishing contractor to apply a texture finish to all ceilings if the specifications call for a spray texture ceiling finish.

NOTE: SPECIAL EQUIPMENT IS NECESSARY FOR SPRAY TEXTURE APPLICATION. EMPLOYMENT OF A SPECIAL CONTRACTOR IS GENERALLY ADVISED.

10.2.9 Layout, cut and install ceramic tile wall coverings to high moisture content areas in the bath, kitchen and laundry areas.

10.2.10 Layout, cut and install plastic laminates to bath/shower/ kitchen areas of concentrated moisture.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

10.3.1 Sketch a crossection view and label the following named moldings generally used for contemporary and/or traditional interior designs. Casing, mullion casing, bed mold, stool, apron, stops, cove molds, quarter round, base shoe and base-board.

10.3.2 Sketch and label two general types of interior doors and their parts.

10.3.3 Read the manufactures step by step directions first, then install all pre-hung interior door units according to the manufactures instructions.

10.3.4 Apply finish trim to all windows and special openings such as a fireplace or special built-in cabinets.

10.3.5 Install kitchen cabinet wall units, base units, and counter top in the order mentioned.

NOTE: CUSTOM KITCHEN CABINETS ARE GENERALLY INSTALLED BY THE CUSTOM CABINET MAKER. FACTORY PURCHASED UNIT CABINETS ARE GENERALLY INSTALLED BY THE CARPENTER.

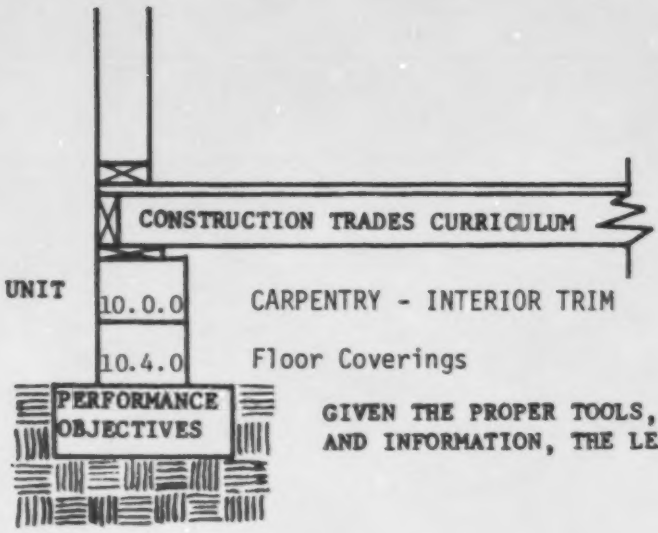
10.3.6 Install bathroom wall cabinets by cutting into a previously framed and wired (electrical) opening or by attaching to the wall if a surface installation is specified.

10.3.7 Install bathroom vanity base cabinets and cabinet tops over the plumbing supply and waste pipes extending from the wall.

10.3.8 Trim stairways by removing temporary treads and fitting finished risers and treads to stairhorses.

10.3.9 Finish the stairway by installing trim to areas of "unfinished exposure".

10.3.10 Install stair handrails and protective ornate railings as specified on the architectural plans.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

10.4.1 List three (3) kinds of hardwood flooring material and contrast their differences.

10.4.2 Prepare the subfloor for hardwood strip flooring installation by thoroughly cleaning, renailing and covering with a good quality 15 lb. asphalt-coated building paper.

10.4.3 Snap a chalk line and face nail the first strip of hardwood flooring to the subfloor about 1/2" to 5/8" from the wall for expansion purposes and at right angles to the floor joists.

10.4.4 Hand nail or use a hammer operated nailer to install successive strips across the rooms.

10.4.5 Face nail the final few courses of hardwood strips on the finished side of the room while exerting pressure to tighten the last few courses.

10.4.6 Employ a floor sanding specialists to sand, stain (if specified), fill (if specified), finish and wax the hardwood installation.

10.4.7 Install an underlayment of plywood or hardboard to areas in the residential structure that are to have resilient type floor coverings.

10.4.8 List five (5) types of resilient floor tile available for use by the professional flooring installer.

10.4.9 Layout the floor for tile installation by snapping two chalklines in the center of the room and at right angles to each other.

10.4.10 Make a trial layout of tile to each wall or projection and measure the distance between the last tile and the wall. Move the center line ½ the distance of a full tile closer to the wall if the measured distance between the last tile and the wall is less than 2 inches or more than 8 inches.

10.4.11 Spread adhesive carefully following manufactures recommendations.

10.4.12 Begin laying tile at the center of the room when adhesive becomes slightly tacky, but will not stick to your thumb.

10.4.13 Roll rubber, vinyl and lincleum immediately after installation of a section of the floor.

NOTE: ASPHALT AND VINYL-ASBESTOS TILE DO NOT NEED TO BE ROLLED.

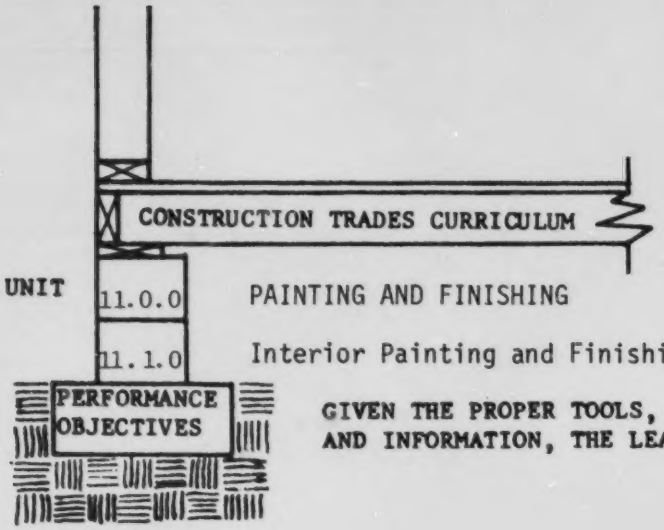
10.4.14 Trim, set border tile and various trim and feature strips if applicable.

10.4.15 Install cove base at junction of floor and walls and around fixtures such as kitchen base cabinet units.

NOTE: A SPECIAL ADHESIVE IS REQUIRED FOR COVE BASE INSTALLATIONS.

10.4.16 Employ a specialized professional flooring mechanic to issue a bid for materials and labor for installation of any sheet flooring materials.

NOTE: THE INSTALLATION OF FLOORING SHEET MATERIALS REQUIRES HIGHLY SPECIALIZED PROCEDURES NORMALLY HANDLED BY THE PROFESSIONAL FLOORING INSTALLER.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

11.1.1 Contrast, beginning in ancient times, in chronological order five (5) major paint vehicles that have been developed and have served or are now serving as vehicles for the paint industry.

11.1.2 Name the solvent for each of the following interior wall finishes: (1)latex (2)flat oil (3)semi-gloss enamel (4)flat alkyd

11.1.3 Name three (3) methods in which paint may be applied to interior wall and ceiling surfaces.

11.1.4 Final sand trim to be stained using 150 grit garnet paper if surface does not feel smooth to the fingertips.

11.1.5 Clean dirt, pencil marks, and dust from trim and doors to be stained using a commercial solvent.

11.1.6 Apply oil stain with a brush or sponge, allow a few minutes for penetration, and wipe away surplus with a clean cloth in the direction of the grain and allow to dry 24 hours.

11.1.7 Fill the pores of open-grained trim by applying a commercial paste wood filler. Apply and remove excess according to manufactures instructions. Allow to dry 24 hours.

NOTE: MUCH DECORATIVE TRIM IS DONE WITH THE USE OF WHITE PINE SPECIES THAT DOES NOT REQUIRE A PASTE WOOD FILLER APPLICATION.

11.1.8 Apply a sealer coat of "thinned top coat material" 24 hours following the paste wood filler application.

11.1.9 Apply two varnish or synthetic top coats and allow adequate time for drying between coats. Smooth between coats using 220 grit abrasive paper to insure a smooth surface.

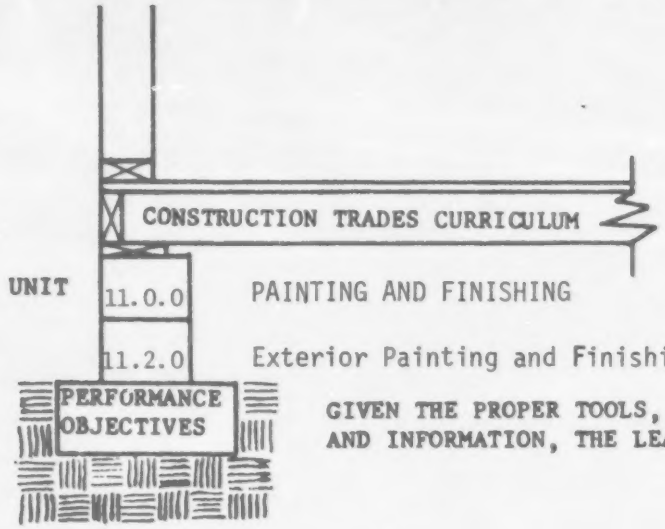
11.1.10 Apply second coat of paint to ceilings, (unless textured) walls, and trim (if not stained).

NOTE: REMEMBER IT CONSUMES LESS TIME TO PRIME THE WALLS BEFORE BEGINNING THE INTERIOR TRIM APPLICATION. SEE PERFORMANCE OBJECTIVE 10.2.7

11.1.11 Apply final coat of paint to ceiling (unless texture) walls, and trim (if not stained).

11.1.12 Write a step by step procedure for cleaning a paint brush beginning with the first step of dipping in the prescribed solvent and ending with wrapping to preserve its shape.

11.1.13 Write an orderly procedure to follow to insure thorough cleaning of a paint roller and tray.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

11.2.1 List, in chronological order, the primary house paint ingrediants as they have developed and changed since the early 20th century.

11.2.2 Write, six (6) of the more common types of paints used for outside surfaces and one (1) major advantage of each.

11.2.3 Compare the two types of natural exterior finishes. Explain what happens after application to wood surfaces.

11.2.4 Write a definition of "pressure treated wood".

11.2.5 Name three (3) methods in which exterior finishes may be applied to outside surfaces of a residential structure.

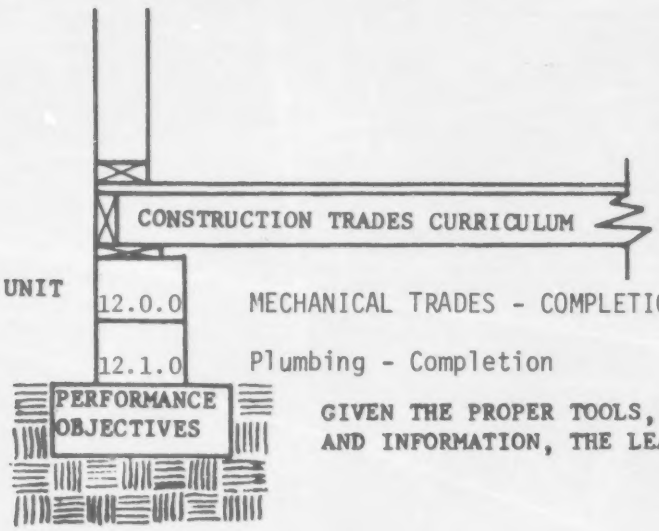
11.2.6 Apply a primer coat of paint by brushing to the trim and siding of a residential structure.

11.2.7 Apply a second finish coat of paint by brushing to the trim and siding of a residential structure.

11.2.8 Chalk around all exterior openings using a caulking gun and a high grade caulking material.

11.2.9 Apply a final coat of paint to the exterior trim and siding.

11.2.10 Write a step by step procedure for cleaning a paint brush beginning with the first step of dipping in the prescribed solvent and ending with wrapping to preserve its shape.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

12.1.1 Connect permanent plumbing fixtures to water supply and waste disposal systems in baths, kitchen, laundry, basement, utility and garage areas. Permanent plumbing fixtures include all fixtures connected to the water supply and/or the waste disposal system.

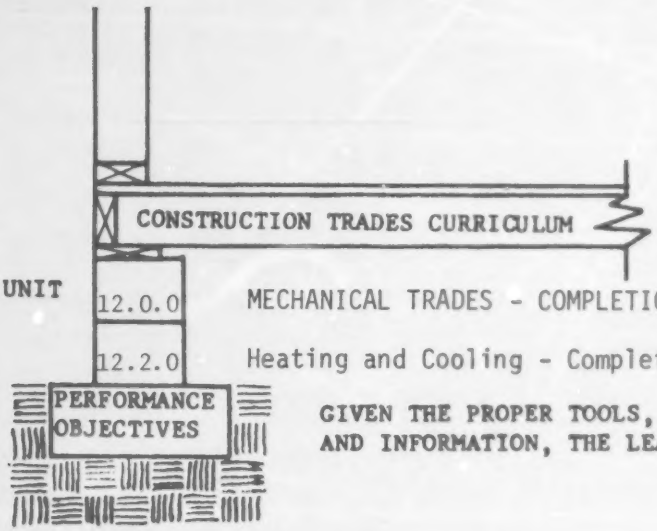
12.1.2 Install water heater in specified position and extend vent through the roof or connect to the furnace vent if a combustible fuel is to be used.

12.1.3 Connect water heater to cold water distribution supply main and hot water distribution supply main.

12.1.4 Connect gas consuming appliances (water heater, clothes dryer, range, incinerator) to previously capped gas pipe risers.

12.1.5 Connect gas piping to special purpose appliances if applicable. Such appliances include gas lights, barbecue grills, gas refrigerators and air conditioning compressor units.

12.1.6 Test all water, waste and gas connections for leaks and operate each consuming device to confirm proper working order.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

12.2.1 Install heating and cooling units and connect to ducted delivery system if applicable.

12.2.2 Connect heating unit to gas supply riser previously placed if applicable.

12.2.3 Extend venting system for heating unit through the roof if a combustible fuel is used to heat the structure.

12.2.4 Install and connect heating and cooling controls. (thermostat)

12.2.5 Place warm air diffusers over register boots in each room and fasten in position at the intersection of the floor and wall.

NOTE: WARM AIR FLOOR DIFFUSERS DROP INTO THE REGISTER BOOT WITHOUT ANY ADDITIONAL FASTENING NEEDED.

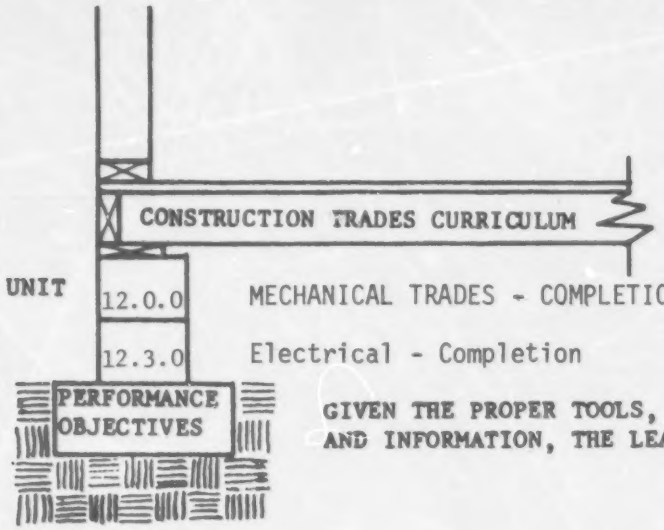
12.2.6 Secure room return air grilles in position using screws supplied.

NOTE: POSITION GRILLES SO THE OBSERVER CANNOT SEE DIRECTLY INTO THE OPENING BEHIND THE GRILLS.

12.2.7 Install humidifier, depending on type, directly on the furnace cabinet, warm air plenum, or within the return or supply air stream. Connect humidifier to cold water supply line using plastic or copper tubing and saddle valve.

NOTE: IF A REMOTE INSTALLATION IS DESIRED, FOLLOW MANUFACTURES DIRECTION.

12.2.8 Provide ducts and roof/wall jacks for all appliances and fans that exhaust air to the exterior of the structure. Generally these include: clothes dryers, cooking ranges, and ceiling or wall mounted exhaust fans.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

12.3.1 Connect and install all ceiling and wall light fixtures as specified on the architectural drawing and/or local electrical code requirements.

12.3.2 Connect all electrical convenience outlets and switches and secure in electrical outlet boxes previously placed as specified on the architectural drawings and/or local electrical code requirements. Affix wall cover plates to openings where applicable.

12.3.3 Connect garbage disposal to electrical supply as specified by local/national electrical code requirements.

NOTE: GENERALLY BX CABLE IS SPECIFIED FOR THIS APPLICATION.

12.3.4 Connect electrical service to heating unit as specified by local/national electric code requirements. Include control devices as specified by the manufacturer.

12.3.5 Connect dishwasher to electrical power supply as specified by local/national electric code requirements.

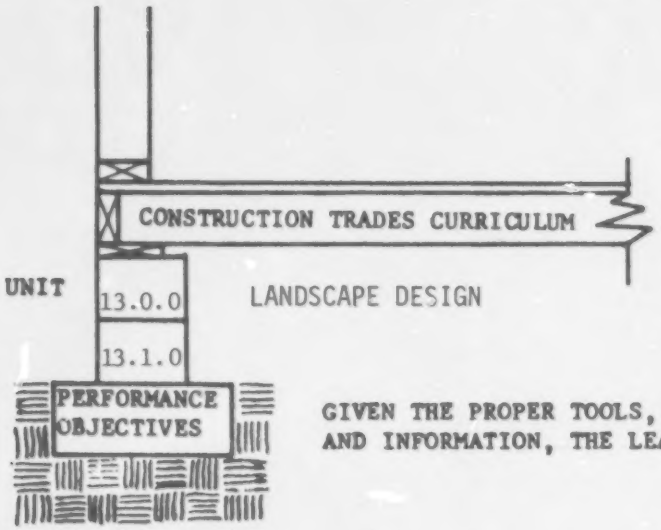
12.3.6 Connect air conditioner condensing unit or heat pump to electrical supply using control devices as specified by the manufacturer and in accord with local/national electrical code requirements.

12.3.7 Connect and install all exterior light fixtures as specified on the architectural plans and in accord with local/national electrical code requirements.

12.3.8 Connect other electrical devices not previously completed. These may include wall/ceiling fans, water heaters, cooking ranges, door chimes and other electrical fixtures or appliance as specified on the architectural plans. Connect all electrical devices as specified by the local/national electric code.

12.3.9 After testing all circuits to insure proper functioning, request an inspection of the complete electrical system by the local electrical inspector.

12.3.10 Upon approval of the local electrical inspector, request the local utility company to connect the electric service to the residential structure by placing an electric meter in the service entrance previously installed.



GIVEN THE PROPER TOOLS, EQUIPMENT, MATERIALS, CONDITIONS AND INFORMATION, THE LEARNER WILL:

13.1.1 Following the completion of all construction and finishing activities on the exterior of the structure, prepare the finish grade for proper water drainage by notifying the subcontractor previously employed to complete grading and leveling operations according to specification standards and directions included on the architectural drawings.

13.1.2 Layout and construct any special exterior features such as garden walks, retaining walls, privacy or decorative fencing as specified on the architectural drawings.

13.1.3 Locate and construct areas for group tree, shrub or flower plantings as specified on landscape plan.

13.1.4 Locate and plant ornamental trees, shade trees, shurbs and flowers according to directions on the landscape plan and within the planting season dates in the geographic area where site is located.

13.1.5 Prepare earth for seeding by loosening the soil a few inches deep either by hand or mechanical means.

NOTE: GRADING CONTRACTORS WILL GENERALLY PROVIDE FOR SEED BED PREPARATION AND PLANTING IF DESIRED.

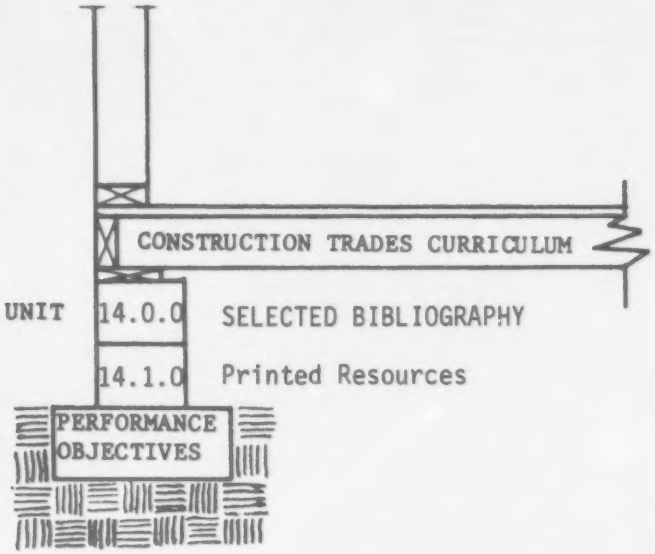
13.1.6 Apply a balanced fertilizer to the freshly prepared seed bed. Obtain a soil analysis to ascertain fertilizer need from county agricultural extension agent or local business firms specializing in the sale and application of farm fertilizers. Rate of application should be coordinated with need and strength of nitrogen, phosphorus and potash.

13.1.7 Apply a blend of grass seed appropriate for the climate and suitable for establishing quick germination and cover to stabilize the soil. More permanent grasses usually have a longer germination period and can benefit from a quick cover to help stabilize the soil in the event of excessive moisture. Adjust the rate of application to maufactures recommendations.

13.1.8 Spread a thin cover of wheat or oat straw over the completed seed bed for the purpose of retaining soil moisture in the event of extended dry periods.

NOTE: BE VERY CAREFULL NOT TO BUILD A LAYER OF STRAW THAT WILL PREVENT ADEQUATE LIGHT TO ENTER FOR HEALTHY GROWTH AFTER GERMINATION.

13.1.9 Install sod to yard areas where a lawn is desired by placing strips of sod firmly adjacient to each other. Follow growers directions for placement and care following placement.



Alth, Max. Do-It-Yourself Plumbing. New York: Popular Science Books, Times Mirror Magazines, Inc., 1975.

American Institute of Architects. Life Cycle Cost Analysis: Guide For Architects. New York: American Institute For Architects, 1977.

American Instiute of Timber Construction. Timber Construction Manual. 2nd Ed. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1974.

American Plywood Association. Mod 24 Building Guide. Tacoma, WA: By Author, 1119 A St., 1970.

American Plywood Association. Plywood Information Packet. Tacoma, WA: By Author, 1119 A St., 1976. (8 Booklets).

American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc. ASHRAE Handbook of Fundamentals. New York: American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc., 1972.

American Society of Landscape Architects Foundation. Site Planning For Solar Energy Utilization. Washington, DC: National Technical Information Service, 1976.

Andersen Corporation. Facts About Window Condensation. Bayport, MN: Andersen Corp., 1973.

Andersen Corporation. Technical Data - Computing Heat Loss For Andersen Windows. Bayport, MN: Andersen Corp., 1964.

Andersen Corporation. The Condensation Answer Book. Bayport, MN: Andersen Corp., 1977.

Anderson, Edwin P. Air Conditioning. Indianapolis, IN: Howard W. Sams and Co., Inc., 1969.

Anderson, Edwin P. Home Refrigeration and Air Conditioning. 2nd Ed. Indianapolis, IN: Howard W. Sams and Co., Inc., 1966.

Anderson, L. O.; Heebink, T. B.; and Oviatt, A. E. Wood Decks: Construction and Maintenance. New York: Drake Publishers, Inc., 1977.

Anderson, L. O. Wood Frame House Construction. Los Angeles: Craftsman Book Co. of America, 1971.

Andrews, F. T. Building Mechanical Systems. 2nd Ed. Huntington, NY: Robert E. Krieger Publishing Co., 1976.

Ardnin, Jeffrey E. Climate and Architecture. New York: Reinhold, 1953.

Asher, Benjamin. The American Builders Companion. New York: Dover Publications, 1969.

ASHRAE. Application of Solar Energy for Heating and Cooling of Buildings. New York: American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc., 1977.

Atton, W. Estimating Applied to Building - Metric Edition. London: George Godwin, Ltd./Construction Publishing Co., Inc., 1975.

Badzinski, Stanley. Carpentry In Residential Construction. Englewood Cliffs, NJ: Prentice-Hall, IN, 1972.

Badzinski, Stanley. House Construction: A Guide To Buying, Building And Evaluating. Englewood, Cliffs, NJ: Prentice-Hall, Inc., 1976.

Badzinski, Stanley. Roof Framing. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Badzinski, Stanley, Jr. Stair Layout. Chicago: American Technical Society, 1971.

Baker, G. E., and Yeager, L. Dayle. Wood Technology. Indianapolis, IN: Howard W. Sams and Co., Inc., 1974.

Baker, Glenn, and Crow, Leonard R. Electricity Fundamentals. Indianapolis, IN: Howard W. Sams and Co., Inc., 1971.

Baker, Glenn E. Construction: Techniques. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Barrows, Claire M. Living Walls - How To Appreciate and Install Wallpaper and Wall Coverings. New York: Wallpapering Council, 1968.

Beckett, H. E., and Godfrey, J. A. Windows - Performance, Design and Installation. New York: Van Nostrand Reinhold Co., 1974.

Beckman, William A.; Klein, Stanford A.; and Duffie, John A. Solar Heating Design. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1977.

Bellis, Herbert F., and Schmidt, Walter A. Blueprint Reading For The Construction Trades. 2nd Ed. New York: McGraw-Hill Book Co., 1978.

Bennett, Corwin A. Spaces For People: Human Factors In Design. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Bennett, Robert. Sun Angles For Design. Bala Cynwyd, PA: By Author, 6 Snowden Rd. (SE-1), 1978.

Benson, Ben. Building Contractor's and Home Builder's Handbook of Bidding, Surveying and Estimating. Englewood Cliffs, NJ: Prentice-Hall, 1968.

Benson, Ben. Critical Path Methods In Building Construction. Englewood Cliffs, NJ: Prentice-Hall, 1970.

Betts, M. Roger; Fannin, John; and Hamenstein, A. Dean, Editors. Exploring The Construction Industry. Bloomington, IL: McKnight Publishing Co., 1976.

Bowles, Joseph E. Foundation Analysis And Design. 2nd Ed. New York: McGraw-Hill Book Co., 1977.

Braden, Spruille, III. Graphic Standards Of Solar Energy. Boston: CBI Publishing Co., Inc., 1977.

Brimer, John Burton. Complete Outdoor Building Book. New York: Popular Science Publishing Co., Times Mirror Magazines, Inc., 1971.

Brinkworth, B. J. Solar Energy For Man. New York: John Wiley and Sons, Inc., 1973.

Brodatz, Phil, and Watson, Dori. The Elements of Landscape. New York: Hacker Art Books, Inc., 1968.

Brown, P.; Clifton, J.; and Frohnsdorff, G. Energy Conservation Through The Facilitation Of Increased Blended Cement Use. NBS Interagency Report 76-1008, Feb., 1976. Springfield, VA: National Technical Information Service, U.S. Department of Commerce, 1976.

Brushnell, William. Painting and Decorating Encyclopedia. South Holland, IL: Goodheart-Willcox, 1973.

Building Cost File 1978. New York: Construction Publishing Co., Inc., 1977.

Bulkley, W. F. Tree Planting For You. Urbana, IL: University of Illinois, College of Agriculture, Extension Service In Agriculture and Home Economics, 1962.

Burbank, Nelson L., and Phelps, Charles. House Carpentry Simplified. New York: Simmons-Boardoman Publishing Co., 1958.

Burbank, Nelson L. and Shaftel, Oscar. House Construction Details. New York: Simmons-Boardman Publishing Corp., 1959.

Bush, Vincent G. Safety In The Construction Industry: OSHA. Englewood Cliffs, NJ: Prentice-Hall, 1975.

Capotosto, John. Basic Carpentry. Englewood Cliffs, NJ: Prentice-Hall, 1975.

Capotosto, John. Residential Carpentry. Englewood Cliffs, NJ: Reston Publishing Co., Inc./Prentice-Hall, Inc., 1978.

Carrier Air Conditioning Co. Handbook Of Air Conditioning System Design. Stamford, CT: Reinhold Publishing Corp., 1965.

Caudill, William Wayne; Lawyer, Frank D.; and Bullock, Thomas A. A Bucket Of Oil - The Humanistic Approach To Building Design For Energy Conservation. Boston: Cahners Publishing Co., 1974.

Center For Building Technology. Building Technology Publications 1965-1975. Washington, DC: National Bureau of Standards, 1976.

Center For Building Technology, National Bureau Of Standards. Building Technology Publications Supplement I: 1976. Washington, DC: Superintendent Of Documents, U.S. Government Printing Office, 1977.

Channing L. Bete Co., Inc. What Everyone Should Know About Natural Gas Safety. Greenfield, MA: Channing L. Bete Co., Inc., 1972.

Channing L. Bete Co., Inc. What Everyone Should Know About Electric Safety. Greenfield, MA: Channing L. Bete Co., Inc., 1972.

Chasis, David A. Plastic Piping Systems. New York: Industrial Press Inc., 1976.

Ching, Frank. Building Construction Illustrated. New York: Van Nostrand Reinhold, 1974.

Clark, Wilson. Energy For Survival: The Alternative To Extinction. New York: Anchor Press/Doubleday and Co., Inc., 1976.

Collier, Keith. Fundamentals of Construction Estimating and Cost Accounting. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1974.

Collins, G. L. Windows and People: A Literature Survey. Building Science Series 70, June, 1975. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1975.

Committee of Stainless Steel Producers. Stainless Steel Data Manual: Suggested Practices For Roofing, Flashing, Copings, Fascias, Gravel Stops, Drainage. New York: American Iron and Steel Institute, 1968.

Committee of Stainless Steel Producers. Stainless Steel - Uses In Architecture. New York: American Iron and Steel Institute, 1968.

Concrete Estimating Handbook. New York: Construction Publishing Co., Inc., 1978.

Conklin, Groff. The Weather Conditioned House. New York: Reinhold, 1958.

Considine, Douglas M., Ed. Energy Technology Handbook. New York: McGraw-Hill Book Co., 1977.

Constantine, Albert, Jr. Know Your Woods. New York: Home Craftsman Publishing Corp., 1959.

Consumer Information Center, General Services Administration. Consumer Information - A Catalog of Selected Federal Publications of Consumer Interest. Pueblo, CO: Consumer Information Center, Winter, 1976-77.

Cook, James P. Construction Sealants and Adhesives. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1970.

Cooper, George H., and Badzinski, Stanley Jr. Building Construction Estimating, 3rd Ed. New York: Gregg/McGraw-Hill, 1971.

Cordon, William A. Freezing and Thawing of Concrete-Mechanisms and Control, American Concrete Institute Monograph Series. Ames, IA: Iowa State University Press, 1966.

Crocker, S. Piping Handbook. 5th Ed. Stamford, CT: Reinhold Publishing Corp., 1967.

Croft, Terrell; Carr, Clifford C.; and Watt, John H. American Electricians' Handbook. 9th Ed. Los Angeles, CA: Craftsman Book Co. of America, 1971.

Crowther, Richard L. Sun Earth. Denver, CO: Crowther/Solar Group, 1976.

Crowther, Richard L. Sun/Earth: How To Use Solar And Climatic Energies. Revised Ed. New York: Charles Scribner's Sons, 1978.

Cunningham, John E. Security Electronics. Indianapolis, IN: Howard W. Sams and Co., Inc., 1970.

Cutler, Lawrence S., and Cutler, Sherrie S. Handbook of Housing Systems For Designers and Developers. New York: Van Nostrand Reinhold Co., 1974.

Dagostino, Frank R. Estimating In Building Construction. 2nd Ed. Englewood Cliffs, NJ: Reston Publishing Co., Inc./Prentice-Hall, Inc., 1978.

Dagostino, Frank R. Mechanical And Electrical Systems In Construction And Architecture. 2nd Ed. Englewood Cliffs, NJ: Reston Publishing Co., Inc./Prentice-Hall, Inc., 1978.

Daniels, G. Emery. The Home Comfort Handbook. New York: Popular Library, 1966.

Davis, Albert J., and Schubert, Robert P. Alternative Natural Energy Sources In Building Design. New York: Van-Nostrand Reinhold, 1976.

Davis, Raymond E., and Kelly, Joe W. Elementary Plane Surveying. 4th Ed. New York: McGraw-Hill Book Co., 1967.

Davis, Raymond E.; Foote, Francis S.; and Kelly, Joe W. Surveying: Theory and Practice. 5th Ed. New York: McGraw-Hill Book Co., 1966.

Day, David. Construction Equipment Guide. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1973.

Debelius, JoAnne R. Energy Conservation Publications. Washington, DC: Institute For Applied Technology, National Bureau of Standards, 1977.

DeCristoforo, R. J. Concrete and Masonry: Techniques and Design. Englewood Cliffs, NJ: Prentice-Hall Inc., 1975.

DeCristoforo, R. J. Housebuilding Illustrated. New York: Popular Science Books, Times Mirrow Magazines, Inc., 1977.

Dezettel, Louis M. ABC's of Electrical Soldering. Indianapolis, IN: Howard W. Sams and Co., Inc., 1968.

Dezettel, Louis M. Masons and Builders Library, 2 Vol. Set. 2nd Ed. Indianapolis, IN: Howard W. Sams and Co., Inc., 1972.

Diez, Roy L., and Maloney, Lawrence D. Builders' Estimating Fact Book. Boston: Cahners Books International, Inc., 1974.

Duffie, John A., and Beckman, William A. Solar Energy Thermal Processes. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1974.

Dunbahn, Walter E. Fundamentals of Carpentry--Practical Construction. Chicago: American Technical Society, 1969.

Dunbahn, Walter E. Fundamentals of Carpentry--Tools, Materials and Practices. Chicago: American Technical Society, 1967.

Duncan, S. Blackwell. The Complete Handbook of Electrical and House Wiring. Blue Ridge Summit, PA: Tab Books, 1977.

Duncan, Kenneth. Home Builders and Home Buyers - Blue Print for Happy Home Ownership. New York: Funk and Wagnalls Co., 1951.

Dunham, Clearance W. Foundations of Structures. New York: McGraw-Hill Book Co , 1962.

Dunning, W. J., and Robin, L. P. Home Planning and Architectural Drawing. 2nd Ed. Huntington, NY: Robert E. Krieger Publishing Co., 1976.

Eaton, Duane E., Ed. Construction Training Resource Catalog. Baltimore-Washington International Airport, MD: Associated Builders and Contractors, Inc., 1976.

Edison Electric Institute. All-Weather Comfort Guidelines. New York: Edison Electric Institute, 1977.

Educational Facilities Laboratories Inc. Energy Conservation and the Building Shell. New York: Educational Facilities Laboratories, Inc., 1974.

Egan, M. David. Concepts in Thermal Comfort. Englewood Cliffs, NJ: Prentice-Hall, 1975.

Electrical Estimating Handbook. New York: Construction Publishing Co., Inc., 1975.

Elliott, Stewart, and Wallas, Eugenie. The Timber Framing Book: In Harmony With Nature-Creative Country Construction. York, ME: Housesmiths Press, 1977.

ERDA. Minimum Energy Dwelling - MED. Washington, DC: Energy Research and Development Administration, Office of Conservation, 1975.

Federal Energy Administration. Energy Conservation: Landscaping. Washington, DC: Federal Energy Administration, 1976.

Federal Energy Administration. Guidelines For Saving Energy In Existing Buildings - Building Owners and Operators Manual ECM 1. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1975.

Feirer, J. L., and Hutchings, Gilbert R. Carpentry and Building Construction. Peoria, IL: Charles A. Bennett Co., Inc., 1976.

Feirer, J. L. Woodworking For Industry. Peoria, IL: Charles A. Bennett Co., Inc., 1963.

Feirer, John L. Basic Woodworking. Peoria, IL: Charles A. Bennett Co., Inc., 1978.

Feirer, John L. Cabinetmaking and Millwork. Peoria, IL: Charles A. Bennett Co., Inc., 1977.

Feirer, John L. Wood: Materials and Processes. Peoria, IL: Charles A. Bennett Co., Inc., 1975.

Finney, Edwin A. Better Concrete Pavement Serviceability. American Concrete Institute Monograph Series. Ames, IA: Iowa State University Press, 1973.

Fitch, James M. The American Building: The Environmental Forces That Shape It. 2nd Ed. Boston: Houghton/Mifflin, 1972.

Fletcher, Gordon, and Smoots, V. A. Construction Guide For Soils And Foundations. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1974.

Flynn, D. R.; Quindry, T. L.; Savine, H. J.; and Lacher, M. B. Acoustical and Thermal Performance of Exterior Residential Walls, Doors and Windows. Building Science Series 77, November, 1975. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1975.

Foster, Norman. Construction Estimates From Take-Off To Bid. New York: McGraw-Hill Book Co., 1972.

Frank Paxton Co. Beautiful Woods. 4th Ed. Kansas City: Frank Paxton Co., 1974.

Frankland, Thomas W. Pipe Trades Pocket Manual. Riverside, NJ: Glencoe Press, 1969.

Friedmann, Arnold; Pile, John E.; and Wilson, Forrest. Interior Design: An Introduction To Architectural Interiors. New York: American Elsevier Publishing Co., Inc., 1970.

Gale, D. W. Specification Primer: Building Construction. 2nd Ed. Huntington, NY: Robert E. Krieger Publishing Co., 1978.

Garland, J. D. National Electrical Code Reference Books. Englewood Cliffs, NJ: Prentice-Hall, 1977.

Geary, Don. Roofs and Sidings: A Practical Guide. Englewood Cliffs, NJ: Reston Publishing Co., Inc./Prentice-Hall, Inc., 1978.

Geiger, Rudolph. The Climate Near The Ground. Cambridge, MA: Harvard University Press, 1966.

General Home Service. System Approach Home Building Process: PIRT. Dalton, MA: By Author, Dept. FH, P.O. Box 51 (01226), 1978.

Givoni, B. Man, Climate and Architecture. New York: Elsevier Publishing Co., Ltd., 1969.

Gladstone, J. Mechanical Estimating Guidebook. 4th Ed. Stamford, CT: Reinhold Publishing Corp., 1970.

Goodban, William T., and Hayslett, Jack H. Architectural Drawing and Planning. 2nd Ed. New York: McGraw-Hill Book Co., 1972.

Goodman, Louis J., and Karol, R. H. Theory and Practice of Foundation Engineering. New York: The Macmillan Co., 1968.

Graham, Kennard C. Interior Electric Wiring-Residential. 6th Ed. Chicago: American Technical Society, 1961.

Graham, Kennard C. Industrial and Commercial Wiring. 2nd Ed. Chicago: American Technical Society, 1973.

Graham, Kennard C. National Electric Code and Blue Print Reading. Chicago: American Technical Society, 1960.

Grinter, Linton E. Elementary Structural Analysis and Design. 2nd Ed. New York: The Macmillan Co., 1965.

Crow, Thomas A. Construction: A Guide For The Profession. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1975.

Gunerman, Milton, Ed. How To Operate Your Power Tools. New York: The Home Craftsman Publishing Corp., 1950.

Hammond, James J.; Donnelly, Edwart T.; Harrod, Walter F.; and Rayner, Norman A. Woodworking Technology. 3rd Ed. Bloomington, IL: McKnight Publishing Co., 1972.

Handley, William, Ed. Industrial Safety Handbook. 2nd Ed. New York: McGraw-Hill Book Co., 1977.

Harmon, A. J. The Guide To Home Remodeling. New York: Holt, Rinehart and Winston, 1966.

Harris, Cyril M., Ed. Dictionary of Architecture and Construction. New York: McGraw-Hill Book Co., 1975.

Harris, Norman C., and Conde, David F. Modern Air Conditioning Practice. 2nd Ed. New York: McGraw-Hill Book Co., 1974.

Harrison, Henry S. Houses - The Illustrated Guide To Construction, Design and Systems. Realtors National Marketing Institute of the National Association of Realtors. Revised Ed. New Haven, CT: Collegiate Distributing Co., 1976.

Haynie, Paul. Cabinetmaking. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Herrick, Clyde N. Electrical Wiring: Principles and Practices. Englewood Cliffs, NJ: Prentice-Hall, 1975.

Herubin, Charles A. Principles of Surveying. 2nd Ed. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1978.

Hoffman, Kurt, and Griese, Helga. Building With Wood: Form, Structural Design, and Preservation. New York: Hacker Art Books, Inc., 1969.

Hooper, Lee. Introduction To Construction Drafting. Englewood Cliffs, NJ: Prentice-Hall, 1971.

Hopf, Peter S. Designers Guide To OSHA. New York: McGraw-Hill Book Co., 1975.

Hornbostel, Caleb, and Hornung, William J. Methods and Materials For Contemporary Construction. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1974.

Hornung, William J. Architectural Drafting. 5th Ed. Englewood Cliffs, NJ: Prentice-Hall, 1971.

Hornung, William J. Blueprint Reading: An Interpretation of Architectural Working Drawings. Englewood Cliffs, NJ: Prentice-Hall, 1961.

Hornung, William J. Construction: Systems and Materials. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Hornung, William J. Estimating Building Construction: Quantity Surveying. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1970.

Howell, D. Your Solar Energy Home - Including Wind and Methane Applications. Hastings, Sussex, England: Pergamon Press, 1978.

Huntington, Whitney Clark, and Mickadeit, Robert E. Building Construction: Materials and Types of Construction. 4th Ed. New York: John Wiley and Sons, Inc., 1975.

Huntoon, Maxwell C. PUD-A Better Way For The Suburbs. Washington, DC: Urban Land Institute, 1971.

Huff, Darrell, and Huff, Frances. Complete Book of Home Improvements. New York: Popular Science Publishing Co., Harper and Row, 1970.

Insulation Board Institute. Fundamentals of Building Insulation. Chicago: By Author, 1963.

Insulation Board Institute. How To Build And Sell The Quiet Home. Chicago: By Author, 1966.

Insulation Board Institute. Noise Control With Insulation Board. 2nd Ed. Chicago: By Author, 1964.

Irvin, Daniel. Power Tool Maintenance. New York: McGraw-Hill Book Co., 1971.

Jacobs, M., and Petersen, S. R. Making The Most Of Your Energy Dollars In Home Heating And Cooling. NBS Consumer Information Series 8, June, 1975. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1975.

Janke, Rolf. Architectural Models. New York: Hacker Art Books, Inc., 1962.

Jensen, Rolf, Ed. Fire Protection Systems For The Design Professional. Boston: Cahners Publishing Co., 1975.

Johnson, Robert C. Electrical Wiring: Design and Construction. Englewood Cliffs, NJ: Prentice-Hall, 1971.

Jones, R. Framing, Sheathing and Insulation. Albany, NY: Delmar Publishers, 1973.

Jones, Rudard A. Basic Construction and Materials Take Off. Urbana, IL: University of Illinois, Small Homes Council-Building Research Council, 1970.

Kaberlein, Joseph J. Air Conditioning Metal Layout. 3rd Ed. Riverside, NJ: Glencoe Press, 1973.

Katz, Robert D. Design of the Housing Site: A Critique of American Practice. Urbana, IL: University of Illinois, Small Homes Council-Building Research Council, 1967.

Kaufman, Milton, and Wilson, J. A. Basic Electricity: Theory and Practice. New York: Gregg/McGraw-Hill, 1973.

Kazanas, H. C., and Lindbeck, John R. Technology of Industrial Materials. Peoria, IL: Charles A. Bennett Co., Inc., 1974.

Kelly, G. E., and Bean, J. Dynamic Performance Of A Residential Air-To-Air Heat Pump. Building Science Series 93, March, 1977. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1977.

Kenny, Michael F. Masonry Estimating Handbook. New York: Construction Publishing Co., Inc., 1975.

Khachaturian, Narbey, and Gurfinkel, German. Prestressed Concrete. New York: McGraw-Hill Book Co., 1969.

Kicklighter, Clois E., and Baird, Ronald J. Architecture-Residential Drawing and Design. South Holland, IL: Goodheart-Willcox, 1974.

Kicklighter, Clois E. Modern Masonry. South Holland, IL: Goodheart-Willcox Co., Inc., 1977.

Kigin, Denis J. Teacher Liability in School-Shop Accidents. Ann Arbor, MI: Prakken Publications, Inc., 1973.

Kissam, Philip. Surveying: Instruments And Methods For Surveys Of Limited Extent. 2nd Ed. New York: McGraw-Hill Book Co., 1956.

Kissam, Philip. Surveying Practice. 3rd Ed. New York: McGraw-Hill Book Co., 1978.

Knauer, V., and Branscomb, L. M. 11 Ways To Reduce Energy Consumption And Increase Comfort In Household Cooling. Consumer Bulletin, July 1971. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1971.

Knowles, Jerome. Single-Family Residential Appraisal Manual. Chicago: American Institute of Real Estate Appraisers, 1967.

Kolstad, C. Kenneth. Rapid Electrical Estimating and Pricing. 2nd Ed. New York: McGraw-Hill Book Co., 1974.

Komendant, August E. Contemporary Concrete Structures. New York: McGraw-Hill Book Co., 1972.

Kreider, J. F., and Kreith, F. Practical Design And Economics Of Solar Heating And Cooling. New York: McGraw-Hill Book Co., 1975.

Krenov, James. A Cabinetmaker's Notebook. New York: Van Nostrand Reinhold, 1975.

Kusuda, T. Underground Heat And Chilled Water Distribution Systems. Building Science Series 66, April, 1975. Washington, DC: Superintendent Of Documents, U.S. Government Printing Office, 1975.

Lair, E. A. Carpentry For The Building Trades. 2nd Ed. New York: Gregg/McGraw-Hill, 1971.

Landers, Jack M. Construction - Materials, Methods, Careers. South Holland, IL: Goodheart-Willcox, 1976.

Langley, Billy C. Comfort Heating. Englewood Cliffs, NJ: Prentice-Hall, 1975.

Larson, Thomas D. Portland Cement and Asphalt Concretes. New York: Gregg/McGraw-Hill, 1963.

Lewis, Jack R. Architect's And Engineer's Office Practice Guide. Englewood Cliffs, NJ: Prentice-Hall, 1978.

Lewis, Jack R. Construction Specifications. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1975.

Liebing, Ralph W., and Paul, Mimi Ford. Architectural Working Drawings. New York: John Wiley and Sons, 1977.

Link, David E., Ed. Residential Designs - How To Get The Most For Your Housing Dollar. Boston: Cahners Books International, Inc., 1974.

Lowry, William P. Weather and Life: An Introduction To Biometeorology. New York: Academic Press, 1969.

Lux, Donald. Introduction To Construction Careers. Bloomington, IL: McKnight Publishing Co., 1975.

Macsai, John; Holland, Eugene P.; Nachman, Harry S.; and Yacker, Julius Y. Housing. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1976.

Maguire, Bryon W. Carpentry For Residential Construction. Englewood Cliffs, NJ: Reston Publishing Co., Inc./Prentice-Hall, Inc., 1975.

Maguire, Byron W. Masonry and Concrete. Englewood Cliffs, NJ: Reston Publishing Co., Inc./Prentice-Hall, Inc., 1978.

Maguire, Bryon W. The Complete Book Of Woodworking And Cabinetmaking. Englewood Cliffs, NJ: Prentice-Hall, 1974.

Maldon, Leo D. How To Build With Stone, Brick, Concrete And Tile. Blue Ridge Summit, PA: Tab Books, 1977.

Mallory, John F., and Turner, W. C. Thermal Insulation. 2nd Ed. Huntington, NY: Robert E. Krieger Publishing Co., 1977.

Manas, Vincent T. National Plumbing Code, Illustrated. Craftsman Book Co. Of America, 1970.

Marshall and Swift Publication Co. Residential Cost Handbook - Rapid Method Of Computing Residential Costs. Los Angeles: Marshall and Swift Publication Co., 1971.

Marshalltown Trowel Co. Trowling Tips And Techniques. Marshalltown, IA: By Author, P.O. Box 738, 1976.

McCormac, Jack. Surveying. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1975.

McGraw-Hill Information Systems. Dodge Building Cost and Specification Digest. New York: McGraw-Hill Information Systems Co., 1978.

McGraw-Hill Information Systems. Dodge Construction Pricing And Scheduling Manual. New York: McGraw-Hill Information Systems Co., 1978.

McGraw-Hill Information Systems. Sweet's Architectural Catalog File. 1978 Ed. Vols. 1-12. New York: McGraw-Hill Information Systems Co., 1978 (Annual).

McGraw-Hill Information Systems. Sweet's Interior Design File. 1978 Ed. Vols. 1-10. New York: McGraw-Hill Information Systems Co., 1978 (Annual).

McGraw-Hill Information Systems. Sweet's Light Construction Catalog File. New York: McGraw Hill Information Systems Co., 1978.

McGuinness, William J., and Stein, Benjamin. Building Technology-Mechanical and Electrical Systems. New York: John Wiley and Sons, 1977.

McGuinness, William J., and Stein, Benjamin. Mechanical and Electrical Equipment For Buildings. 5th Ed. New York: John Wiley and Sons, Inc., 1971.

McPartland, J. How To Design Electrical Systems. New York: McGraw-Hill Book Co., 1968.

Meador, Roy. Future Energies. Ann Arbor, MI: Ann Arbor Science Publishers Inc., 1974.

Meredith Corp. "Guide To Gardening And Landscaping," Reprints from Better Homes and Gardens. Des Moines, IA. Meredith Publishing Co., 1969.

Merritt, Frederick S. Building Construction Handbook. 2nd Ed. New York: McGraw-Hill Book Co., 1976.

Middleton, Robert G. Practical Electricity. 3rd Ed. Indianapolis, IN: Howard W. Sams and Co., Inc., 1969.

Miller, Rex. Industrial Electricity. Peoria, IL: Charles A. Bennett Co., Inc., 1978.

Mills, E. D. Planning: Architects Technical Reference. 9th Ed. Huntington, NY: Robert E. Krieger Publishing Co., 1976.

Mitchell, James. Fundamentals Of Soil Behavior. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1976.

Mix, Floyd M., and Cirou, Ernest H., Editors. Practical Carpentry. Chicago: Goodheart-Willcox Co., Inc., 1960.

Mix, Floyd M, House Wiring Simplified. South Holland, IL: Goodheart-Willcox Co., 1973.

Moore, Marvin, and Frisbie, Ned. "Systems Emerge In Building Technology." Industrial Arts and Vocational Education Magazine, December, 1970, pp. 19, 20, and 28.

Muller, Edward J. Architectural Drawing and Light Construction. 2nd Ed. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Muller, Edward J. Reading Architectural Working Drawing. Englewood Cliffs, NJ: Prentice-Hall, 1973.

NAHB. Building Codes, A Selected List of References. Washington, DC: The National Association of Home Builders, 1973.

NAHB Economics Dept. 1978 Single-Family Component Cost Data for Over 350 Cities, Annual Update. Washington, DC: National Association of Home Builders, 1978.

NAHB Manpower Dept. Incentive Apprenticeship Training. Performance Standards for the Residential Carpentry Craft. Washington, DC: National Association of Home Builders.

National Association of Home Builders. NAHB Useful Publications. Washington, DC: By Author, 15th and M Sts., N.W., 1976.

National Bureau of Standards, Department of Commerce. Building Technology Publications 1965-1975. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1976.

National Mineral Wool Insulation Assn. How To Save Money By Insulating Your Home. Summit, NJ: By Author, 382 Springfield Ave.

National Safety Council. Making Safety Work. New York: Gregg/McGraw-Hill, Inc., 1977.

Neal, Charles D. Do-It-Yourself House - Building Step-By-Step. New York: Macmillan Publishing Co., Inc., 1973.

Nelson, Carl A. Mechanical Trades Pocket Manual. Indianapolis, IN: Howard W. Sams and Co., Inc., 1974.

Nelson, William R., Jr. Landscaping Your Home. Urbana-Champaign, IL: University of Illinois College of Agriculture, Cooperative Extension Service, 1975.

Newell, A. C., and Holtrop, W. F. Coloring, Finishing and Painting Wood. Rev. Ed. Peoria, IL: Charles A. Bennett Co., Inc., 1971.

Nicholls, Robert. Composite Construction Materials. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1976.

Nuckolls, James L. Interior Lighting For Environmental Designers. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1976.

O'Brian, James J. CPM In Construction Management. New York: McGraw-Hill Book Co., 1971.

Olgyay, Victor. Bioclimatic Approach To Architectural Regionalism. Princeton, NJ: Princeton University Press, 1963.

Oravetz, Jules, Sr. Plumbers and Pipe Fitters Library, 4-Vol. Set. 2nd Ed. Indianapolis, IN: Howard W. Sams and Co., Inc., 1967.

Painting and Decorating Contractors of America. Estimating Guide for Painting and Decorating. Pub. Annually. Chicago: Painting and Decorating Contractors of America, 1978.

Palmquist, Ronald E. Guide to The 1975 National Electrical Code. Indianapolis, IN: Howard W. Sams and Co., Inc., 1975.

Parker, Harry; Gay, Charles Merrick; and MacGuire, John W. Materials and Methods of Architectural Construction. 3rd Ed. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1958.

Parker, Harry, and Hauf, Harold D. Simplified Engineering for Architects and Builders. 5th Ed. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1975.

Parker, Harry, and MacGuire, John W. Simplified Site Engineering For Architects and Builders. New York: Wiley-Interscience, John Wiley and Sons., Inc., 1954.

Parker, Harry. Simplified Design of Reinforced Concrete. 3rd Ed. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1968.

Parker, Harry. Simplified Design of Roof Trusses for Architects and Builders. 2nd Ed. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1967.

Parker, Harry. Simplified Design of Structural Timber. 2nd Ed. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1963.

Patton, Arthur R. Solar Energy for Heating and Cooling of Building 1975. Energy Technology Review No. 7. Park Ridge, NJ: Noyes Data Corporation, 1975.

Patton, William J. Construction Materials. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1975.

Peavy, B. A.; Powell, F. J.; and Burch, D. M. Dynamic Thermal Performance of an Experimental Masonry Building. Building Science Series 45, July, 1973. Springfield, VA: National Technical Information Service, U. S. Department of Commerce, 1973.

Perth, L. The Steel Square. New Britain, CT: Stanley Tools, Div. of the Stanley Works, 1967.

Pesko, Carolyn, Ed. Solar Directory. Ann Arbor, MI: Ann Arbor Science Publishers Inc., 1975.

Petri, Robert W. Construction Estimating. Englewood Cliffs, NJ: Reston Publishing Co., Inc./Prentice Hall, Inc., 1978.

Peurifoy, Robert L. Construction Planning, Equipment, and Methods. 2nd Ed. New York: McGraw-Hill Book Co., 1970.

Peurifoy, Robert L. Estimating Construction Costs. 3rd Ed. New York: McGraw-Hill Book Co., 1975.

Peurifoy, Robert L. Formwork for Concrete Structures. New York: McGraw-Hill Book Co., 1976.

Pipe, Ted. Basic Electricity Training Manual. Indianapolis, IN: Howard W. Sams and Co., Inc., 1973.

Plantema, F. J. Sandwich Construction. Huntington, NY: Robert E. Krieger Publishing Co., 1966.

Portland Cement Association. Basic Concrete Construction Practices. New York: John Wiley and Sons, Inc., 1975.

Portland Cement Association. Concrete Inspection Procedures. New York: John Wiley and Sons, Inc., 1975.

Portland Cement Association. Outdoor Landscaping With Concrete. Skokie, IL: By author, Old Orchard Road, 1971.

Portland Cement Association. Principles of Quality Concrete. New York: John Wiley and Sons, Inc., 1975.

Portland Cement Association. Special Concretes, Mortars, and Products. New York: John Wiley and Sons, Inc., 1975.

Pothorn, Herbert. Architectural Styles. New York: Viking Press, 1971.

Prestressed Concrete Institute, Architectural Precast Concrete Shop Drawings Committee. Architectural Precast Concrete Drafting Handbook. Englewood Cliffs, NJ: Prentice-Hall, 1975.

Putnam, Robert, and Carison, G. E. Architectural and Building Trades Dictionary. 3rd Ed. Chicago: American Technical Society, 1974.

Putnam, Robert. Concrete Block Construction. 3rd Ed. Chicago: American Technical Society, 1973.

Ramsey, Charles G., and Sleeper, Harold R. Architectural Graphic Standards. 6th Ed. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1970.

Raskin, Eugene. Architecture and People. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1974.

Rathbun, Ivan T. Building Construction Specifications. New York: McGraw-Hill Book Co., 1972.

Ray, J. Edgar, and Johnson, Harold V. The Art of Bricklaying. Peoria, IL: Charles A. Bennett Co., Inc., 1971.

Reid, D. A. G. Construction Principles. London: George Godwin, Ltd./ Construction Publishing Co., Inc.

Richter, H. P. Practical Electrical Wiring. 9th Ed. New York: McGraw-Hill Book Co., 1972.

Ring, Alfred A. Real Estate Principles and Practices. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1972.

Robert Snow Means Company, Inc. Building Construction Cost Data 1978. 36th Annual Ed. Duxbury, MA: Robert Snow Means Company, Inc., 1978.

Robert Snow Means Company, Inc. Building Systems Cost Guide 1976. Duxbury, MA: R. S. Means Co., Inc., 1976.

Robert Snow Means Company, Inc. 1976 Labor Rates for the Construction Industry: City-State-National. 3rd Ed. Duxbury, MA: R. S. Means Co., Inc., 1976.

Rosen, Harold J. Construction Specifications Writing. New York: Wiley-Interscience, John Wiley and Sons, Inc., 1974.

Rosen, Sherman J. Manual for Environmental Impact Evaluation. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Rubin, A. I. Energy Conservation in Buildings - A Human Factors/Systems Viewpoint. Building Science Series 88, November, 1976. Washington, DC: Superintendent of Documents, U. S. Government Printing Office, 1976.

Schmidt, John L.; Lewis, Walter H.; Olin, Harold Bennett. Construction-Principles, Materials and Methods. 2nd Ed. Chicago: American Savings and Loan Institute Press, 1972.

Schroeder, W. L. Soils In Construction. New York: John Wiley and Sons, Inc., 1975.

Schuler, Stanley. The Illustrated Encyclopedia of Carpentry and Woodworking Tools, Terms and Materials. (Special Ed. for Educ. Dept., Stanley Tools). Chester, CT: Pequot Press/Random House, 1973.

Sears, Roebuck and Co. Simplified Electrical Wiring. Chicago: By author, (Any Sears Retail Outlet). 1969.

Siegel, Curt. Structure and Form in Modern Architecture. Huntington, NY: Robert E. Krieger Publishing Co., 1962.

Siegele, H. H. Roof Framing. 2nd Ed. New York: Drake Publishers, Inc., 1971.

Shafer, Robert. The Suburbanization of Multifamily Housing. Lexington, MA: Lexington Books/D. C. Heath and Co., 1974.

Shurcliff, William A. Solar Heated Buildings: A Brief Survey. 12th Ed. Cambridge, MA: By author, 19 Appleton St., 02138, 1976.

Sluzas, Raymond. Graphic Standards of Pre-Fabricated Building Elements. Boston: Cahners Books International, Inc., 1977.

Sluzas, Raymond, and Ryan, Anne. A Graphic Guide to Industrialized Building Elements. Boston: CBI Publishing Co., Inc., 1977.

Small Homes Council - Building Research Council. Current House Construction Practices. Rev. Ed. Urbana, IL: University of Illinois, Small Homes Council - Building Research Council, 1974.

Small Homes Council Publications. Urbana, IL: University of Illinois.

CIRCULAR SERIES -

A1.3 FINANCING THE HOME
A1.5 MAINTAINING THE HOME
A2.0 BUSINESS DEALINGS WITH THE ARCHITECT AND THE CONTRACTOR
B3.0 FUNDAMENTALS OF LAND DESIGN
C1.1 HAZARD-FREE HOUSES FOR ALL
C1.5 LIVING WITH THE ENERGY CRISIS
C2.5 SPLIT-LEVEL HOUSES
C5.1 HOUSEHOLD STORAGE UNITS
C5.12 INDOOR STORAGE
C5.32 KITCHEN PLANNING STANDARDS
C5.4 LAUNDRY AREAS
C5.6 BEDROOM PLANNING STANDARDS
C5.9 GARAGE AND CARPORTS
D7.0 SELECTING LUMBER
D7.2 PLYWOOD
D7.3 PRESSURE-TREATED WOOD
F2.0 BASEMENTS
F2.5 TERMITE CONTROL
F4.4 CRAWL-SPACE HOUSES
F6.2 MOISTURE CONDENSATION
F7.0 CHIMNEYS AND FIREPLACES
F11.0 WINDOW PLANNING PRINCIPLES
F11.2 SELECTING WINDOWS
F11.3 INSULATING WINDOWS AND SCREENS
F12.3 ROOFING MATERIALS
F17.2 BRICK AND CONCRETE MASONRY
G3.1 HEATING THE HOME
G3.5 FUELS AND BURNERS
G4.2 ELECTRICAL WIRING
G5.0 PLUMBING
G6.1 COOLING SYSTEMS FOR THE HOME
H1.0 INTERIOR DESIGN

TECHNICAL NOTES -

TN 1 PREVENTION AND TREATMENT OF CONSTRUCTION DAMAGE TO SHADE TREES
TN 2 BUILT-UP ROOFING DETAILS
TN 4 CONVERTING A CONCRETE SLAB TO A WOOD SUBFLOOR
TN 5 PLANNING FOR MORE SPACE
TN 6 INVESTIGATION OF THE MECHANICAL CHARACTERISTICS OF TRUSS PLATES ON FIRE-RETARDENT-TREATED WOOD

TN 7 APPLICATIONS OF TREATED POLES AND POSTS FOR HOUSE CONSTRUCTION
TN 8 RESIDENTIAL SWIMMING POOLS
TN 9 CONSTRUCTION FOR ATTIC VENTILATION
TN 10 HOME HEATING AND COOLING WITH ELECTRICITY
TN 11 GUSSET PLATES FROM PLYWOOD AND HARDWOOD SCRAP
TN 12 INFLUENCE OF HEEL WEDGES ON THE STIFFNESS AND STRENGTH OF WOOD ROOF TRUSSES WITH METAL PLATE CONNECTIONS
TN 13 MODERNIZATION OF STEAM AND GRAVITY HOT WATER HEATING SYSTEMS

RESEARCH REPORTS -
48-1 TEMPERATURE AND HEAT LOSS CHARACTERISTICS OF CONCRETE FLOORS LAID ON THE GROUND
57-1 TESTS ON EXTERIOR WALL SECTIONS
61-1 CASE STUDIES IN ELECTRICAL HEATING
61-2 AN INVESTIGATION INTO THE CAUSES OF BUILT-UP ROOFING FAILURES
62-1 EXPOSURE TESTS ON CASEIN-GLUED STRUCTURAL COMPONENTS
62-2 SECTIONALIZED HOUSES
65-1 PERFORMANCE CHARACTERISTICS OF THREE RESIDENTIAL ELECTRIC HEATING SYSTEMS
65-2 STUDIES ON MOVEMENTS OF BUILT-UP ROOFING MEMBRANES
67-1 PREASSEMBLED STAIR CONSTRUCTION
73-1 FULL-SCALE TESTS ON A 32-FOOT NAIL-GLUED TRUSS DESIGN WITH 1½" LUMBER
75-1 FULL-SCALE TESTS ON A 28-FOOT NAIL-GLUED TRUSS DEISGN WITH 1½" LUMBER
75-2 FULL-SCALE TESTS ON A 20-FOOT NAIL-GLUED KING-POST TRUSS DESIGN WITH 1½" LUMBER

SHORT COURSE PROCEEDINGS -
17th THE STORY AND ONE-HALF HOUSE PLAN AND CONSTRUCTION. PRECASE FOUNDATIONS, BRIDGING, LAND PLANNING FOR ROW HOUSES (1962)
23rd THE 7/4 HOUSE DESIGN AND CONSTRUCTION. LOW-COST CONSTRUCTION - SELF HELP, APARTMENTS, LAND PLANNING. INSULATED CONCRETE PANEL CONSTRUCTION. WOOD FRAMING FOR COMMERCIAL BUILDINGS, HOUSING RESEARCH IN CANADA (1967)

INSTRUCTION SHEETS -
#3 NAIL-GLUED "W" ROOF TRUSS, 2 x 4 MEMBERS, 3/12 SLOPE, 2'-0" O.C., 20'-8" SPANS
#4 NAIL-GLUED "W" ROOF TRUSS, 2 x 4 MEMBERS, 4/12 SLOPE, 2'-0" O.C., 20'8" TO 28'-8" SPANS
#5 LONG-SPAN "W" ROOF TRUSSES, 2 x 6 CHORD MEMBERS, 2/12, 3/12, 4/12, 2'-0" O.C., 29'-0" TO 40'-8" SPANS
#6 KING-POST NAIL-GLUED ROOF TRUSSES, 2 x 4 MEMBERS, 2/12, 3/12, 4/12 SLOPES, 2'0" O.C., 18'-0" TO 24'-8" SPANS
#7 KING-POST NAIL-GLUED ROOF TRUSSES, 2 x 6 CHORD MEMBERS, 2/12, 3/12, 4/12 SLOPES, 2'-0" O.C., 25'-0" to 32'-8" SPANS
#8 SLOPED-CEILING, PLYWOOD-WEB ROOF FRAMES, 3/12 ROOF SLOPE; 1.5/12 CEILING SLOPE, 21'-0" TO 32'-8" SPANS
#9 PLYWOOD WEB ROOF-FRAME, 1/12 SLOPE, 2'-0" O.C., 20'-8" TO 28'-8" SPANS
#10 HIP ROOF NAIL-GLUED TRUSSES, 3/12 SLOPE, 2'-0" O.C., 21'-0" TO 28'-8" SPANS

#11 GABLE FRAMING USING LADDER-PANELS ON ROOF TRUSSES
#12 RESELECTION OF LUMBER FOR ROOF TRUSSES
#13 VARIATIONS FOR BUILDING THE NAIL-GLUED "W" TRUSS.
#14 NAIL-GLUED ROOF TRUSS 2X4 MEMBERS, 4/12 SLOPE, 2'-0" O.C., 29'-0" TO 34'-8" SPANS. A "W" TRUSS W/KING-POST.
#15 ROOF FRAMES FOR 7/4 HOUSE DESIGNS.
#16 NAIL-GLUED "W" ROOF TRUSS, 2/4 MEMBERS, 5/12 SLOPE, 2'-0" O.C., 20'-8" TO 28'-8" SPANS.
#17 NAIL-GLUED STORAGE ROOF FRAME, 5/12 and 6/12 SLOPE, 2'-0" O.C., 24"-0" TO 28'-0" SPANS.
#20 WALL-PANEL CONSTRUCTION USING DOUBLE HEADER.
#21 NAIL-GLUED HEADER FOR WALL-PANEL SYSTEM.
#22 NAIL-GLUED HEADERS FOR LARGER OPENINGS.
#23 SHALLOW HEADERS FOR WALL-PANEL SYSTEM.
#30 AN ALL-WEATHER WOOD FOUNDATION FOR A CRAWL-SPACE HOUSE.
#31 AN ALL-WEATHER WOOD FOUNDATION FOR A BASEMENT HOUSE.

SPECIAL PUBLICATIONS -
Basic Construction and Materials Take-Off (Revised 1972).
Current House Construction Practices (Revised 1974).

Smith, R. C. Materials of Construction. 2nd Ed. New York: McGraw-Hill Book Co., 1973.

Smith, Ronald C. Principles and Practices of Light Construction. 2nd Ed. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1970.

Smith, Thomas W., and Jenkins, John. The Household Energy Game. Madison, WI: University of Wisconsin Sea Grant College Program, 1976.

Soderberg, George A. Finishing Technology. 3rd Ed. Bloomington, IL: McKnight Publishing Co., 1969.

Solar Energy Program Team. Intermediate Minimum Property Standards For Solar Heating and Domestic Hot Water Systems. NBS Interagency Report 76-1059, April, 1976. Springfield, VA: National Technical Information Service, U.S. Department of Commerce, 1976.

Sommer, Robert. Personal Space: The Behavorial Basis And Design. Englewood Cliffs, NJ: Prentice-Hall, 1969.

Source Directory - Educational, Single-Concept Movie Loops. 4th Ed. Costa Mesa, CA: Technicolor, Commercial and Educational Div., 1967.

Sowers, George B., and Sowers, George F. Introductory Soil Mechanics and Foundations. New York: The Macmillan Co., 1961.

Spence, William P. Construction: Architectural Drawing. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Spence, William P. Architecture: Design-Engineering-Drawing. 2nd Ed. Bloomington, IL: McKnight Publishing Co., 1972.

Spetgang, I., and Wells, M. Your Home's Solar Potential. Barrington, NJ: Edmund Scientific Co., 1975.

Springer, George S., and Smith, Gene E. The Energy-Saving Guidebook. Westport, CT: Technomic Publishing Co., 1976.

Steinberg, Joseph and Stempel, Martin. Estimating For The Building Trades. 2nd Ed. Chicago: American Technical Society, 1973.

Stern, Robert A. M. New Directions In American Architecture. New York: George Braziller, Inc., 1969.

Stoecker, W. F. Principles For Air Conditioning Practice. New York: Industrial Press Inc., 1968.

Strock, Clifford, and Koral, Richard L., Editors. Handbook Of Air Conditioning, Heating And Ventilating. 2nd Ed. New York: Industrial Press Inc., 1965.

Strock, Clifford, and Koral, Richard L. Handbook Of Air Conditioning, Heating And Ventilating. 2nd Ed. Stamford, CT: Reinhold Publishing Corp., 1965.

Sundberg, Elmer W. Building Trades Blue-Print Reading, Part I Fundamentals. 5th Ed. Chicago: American Technical Society, 1972.

Sundberg, Elmer W. Building Trades Blue-Print Reading, Part II Residential And Light Commercial Construction. 2nd Ed. Chicago: American Technical Society, 1974.

Swezey, Kenneth M. Formulas, Methods, Tips and Data for Home and Workshop. New York: Popular Science Publishing Co., Harper and Row, 1969.

Tab Books. Concrete and Masonry. Blue Ridge Summit, PA: Tab Books, 1976.

Tab Books. Practical Home Construction/Carpentry Handbook. Blue Ridge Summit, PA: Tab Books, 1976.

Task Committee on Wood, ASCE Structural Division. Wood Structures: A Design Guide and Commentary. New York: American Society of Civil Engineers, 1975.

Taylor, J. B. Plastering. London: George Godwin, Ltd./Construction Publishing Co., Inc.

Taylor, John R. Model Building For Architects And Engineers. New York: McGraw-Hill Book Co., 1971.

Technical Services Div. Lumber And Wood Products Literature. Washington, DC: National Lumber Manufacturers Assn. (N.D.).

The Building Research Establishment. Building Construction. Vol. I: Essential Data For Construction. Boston: Cahners Publishing Co., 1974.

The Building Research Establishment. Building Materials. Vol. II: Essential Data For Construction. Boston: Cahners Publishing Co., 1974.

The Commission on Engineering Education. A Note Book On Engineering Films 1969. 2nd Ed. Washington, DC: Commission On Education, National Academy of Engineering, 1969.

The Reader's Digest Association. Reader's Digest Complete Do-It-Yourself Manual. New York: The Reader's Digest Association, 1973.

Tobey, George B., Jr. A History of Landscape Architecture: The Relationship Of People To Environment. New York: American Elsevier Publishing Co., Inc., 1973.

Traister, John E. Electrical Specifications For Building Construction. Englewood Cliffs, NJ: Preston Publishing Co., Inc./Prentice-Hall, Inc., 1977.

Traister, John E. Practical Plumbing Drafting. Indianapolis, IN: Howard W. Sams and Co., Inc., 1973.

Traister, John E. Principles of Illumination. Howard W. Sams and Co., Inc., 1973.

Tricomi, Ernest. ABC's of Air Conditioning. Indianapolis, IN: Howard W. Sams and Co., Inc., 1970.

Troxell, George E.; Davis, Homer E.; and Kelly, Joe W. Composition And Properties Of Concrete. New York: McGraw-Hill Book Co., 1968.

Ulrey, Harry F. Building Construction and Design. Indianapolis, IN: Howard W. Sams and Co., Inc., 1970.

Ulrey, Harry F. Carpenters and Builders Library, 4-Vol. Set. 3rd Ed. Indianapolis, IN: Howard W. Sams and Co., Inc., 1970.

Ulrey, Harry F. Carpentry and Building. Indianapolis, IN: Howard W. Sams and Co., Inc., 1966.

UNICOM-Technical Services Div. The UNICOM Method of House Construction. Washington, DC: National Lumber Manufactures Association, 1964.

U.S. Department of Agriculture. House Construction. Rev. Ed. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1973.

U.S. Department of Agriculture. Subterranean Termites - Their Prevention and Control in Buildings. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1972.

U.S. Department of Agriculture. Water Supply Sources For The Farmstead And Rural Home. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1972.

U.S. Department of Agriculture. Wood Siding - Installing, Finishing and Maintaining. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1973.

U.S. Department of Housing and Urban Development. HUD Minimum Property Standards - One and Two Family Dwellings. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1973.

U.S. Department of Housing and Urban Development. Manual of Acceptable Practices To The HUD Minimum Property Standards. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1973.

U.S. Department of Housing and Urban Development. Solar Dwelling Design Concepts. Washington, DC: Superintendent of Documents, U.S. Government Printing Office, 1976.

U.S. Department of Housing and Urban Development. Solar Energy and Your Home. Washington, DC: U.S. Department of Housing and Urban Development, 1976.

Van Der Braden, F., and Hartsell, Thomas L. Plastering Skills And Practice. 2nd Ed. Chicago: American Technical Society, 1971.

Waddell, Joseph J., Ed. Concrete Construction Handbook. New York: McGraw-Hill Book Co., 1974.

Waddell, Joseph J. Practical Quality Control For Concrete. 2nd Ed. Huntington, NY: Robert E. Krieger Publishing Co., 1977.

Wade, Gary. Homegrown Energy - Power For The Home And Homestead. New York: Charles Scribner's Sons, 1976.

Wagner, Willis H. Modern Carpentry. South Holland, IL: Goodheart-Willcox Company, 1976.

Wakita, Osamu A., and Linde, Richard M. The Professional Practice of Architectural Detailing. New York: John Wiley and Sons, 1977.

Wanslow, Robert. Kitchen Planning Guide. Urbana, IL: University of Illinois, Small Homes Council-Building Research Council, 1965.

Wass, Alanzo. Building Construction Estimating. 2nd Ed. Englewood Cliffs, NJ: Prentice-Hall, 1970.

Wass, Alonzo. Methods and Materials of Residential Construction. 2nd Ed. Englewood Cliffs, NJ: Prentice-Hall, 1978.

Watkins, A. M. Building Or Buying The High-Quality House At The Lowest Cost. New York: Doubleday and Co., 1962.

Watson, Donald A. Construction Materials and Processes. 2nd Ed. New York: McGraw-Hill Book Co., 1978.

Watson, Donald. Designing and Building A Solar House. Charlotte, VT: Garden Way Publishing Co., 1976.

Watson, Donald A. Specifications Writing For Architects And Engineers. New York: Gregg McGraw-Hill, 1964.

Watt, John. NFPA Handbook of the National Electrical Code. 3rd Ed. New York: McGraw-Hill Book Co., 1972.

Weaver, Rip. Process Piping Drafting. 2nd Ed. Houston, TX: Gulf Publishing Co., 1975.

Weaver, Gerald L. Structural Detailing For The Technician. New York: McGraw-Hill Book Co., 1974.

Weaver, Rip. Structural Drafting. Houston, TX: Gulf Publishing Co., 1977.

Weidhass, Ernest R. Architectural Drafting and Construction. Boston: Allyn and Bacon, Inc., 1974.

Weidhass, Ernest R. Architectural Drafting and Design. 3rd Ed. Boston: Allyn and Bacon, Inc., 1977.

Weidhass, Ernest R. Reading Architectural Plans For Residential And Commercial Construction. Boston: Allyn and Bacon, Inc., 1977.

Weiss, William. Home Maintenance. Peoria, IL: Charles A. Bennett Co., Inc., 1978.

Wheeler, Gershon. Interior Painting, Wallpapering, and Paneling: A Beginner's Approach. Englewood Cliffs, NJ: Prentice-Hall, 1974.

Whitehurst, E. A. Evaluation of Concrete Properties From Sonic Tests. American Concrete Institute Monograph Series. Ames, IA: Iowa State University Press, 1966.

Whiton, Sherrill. Elements of Interior Design and Decoration. Philadelphia: J. B. Lippincott Co., 1963.

Williams, Harry. Construction Practices. Englewood Cliffs, NJ: Prentice-Hall, 1975.

Williams, J. Richard. Solar Energy Technology and Applications. Ann Arbor, MI: Ann Arbor Science Publishers Inc., 1975.

Wilson, Forrest. Graphic Guide To Interior Design. New York: Van Nostrand Reinhold, 1976.

Wilson, J. D., and Werner, S. D. Simplified Roof Framing. 2nd Ed. New York: Gregg/McGraw-Hill, 1948.

Wilson, J. Douglas, and Werner, S. O. Simplified Stair Layout. 2nd Ed. Los Angeles, CA: Craftsman Book Co. of America, 1973.

Woodruff, N. P. Shelterbelt and Surface Barrier Effects. Technical Bulletin 77. Manhattan, KS: Agricultural Experiment Station, 1954.

Woods, Hubert. Durability of Concrete Construction. American Concrete Institute Monograph Series. Ames, IA: Iowa State University Press, 1968.

Wright, Frank Lloyd. The Natural House. New York: Bramhall House, 1956.

A D D E N D A

Alerich, Walter N. Electrical Construction Wiring. Chicago: American Technical Society, 1970.

Dalzell, J. Ralph, and Townsend, Gilbert. Masonry Simplified - Tools, Materials, Practices. 3rd Ed. Chicago: American Technical Society, 1973.

DiDonno, Lupe, and Spealing, Phyllis. How To Design And Build Your Own House. New York: Popular Science/Harper and Row, 1977.

Durbahn, Walter E., and Putnam, Robert E. Fundamentals of Carpentry 1: Tools, Materials and Practices. 5th Ed. Chicago: American Technical Society, 1977.

Durbahn, Walter E., and Sunberg, Elmer W. Fundamentals of Carpentry 2: Practical Construction. 5th Ed. Chicago: American Technical Society, 1977.

Gebert, Kenneth L. National Electrical Code Blue Print Reading. 7th Ed. Chicago: American Technical Society, 1978.

Hand, A. J. Home Energy How-To. New York: Popular Science/Harper and Row, 1977.

Palmquist, Ronald E. House Wiring. 3rd Ed. Indianapolis, IN: Howard W. Sams and Co., Inc., 1975.

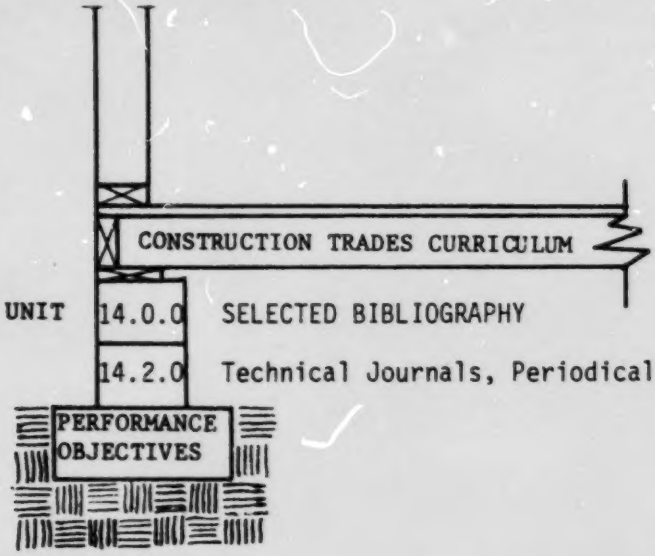
Ripka, L. V. Plumbing Installation and Design. Chicago: American Technical Society, 1978.

Rockis, G. Residential Wiring. Chicago: American Technical Society, 1978.

Zehner, John R. Builder's Guide To Contracting. New York: McGraw-Hill Book Co., 1975.

Zion, Robert L. Trees For Architecture And The Landscape. New York: Van Nostrand Reinhold, 1969.

Zook, Wayne. Construction And Manufacturing Wood Products. Bloomington, IL: McKnight Publishing Co., 1973.



AIR CONDITIONING, HEATING AND REFRIGERATION NEWS: Business News Publishing Co., P.O. Box 6000, Birmingham, MI 48012

AIR CONDITIONING, HEATING AND VENTILATING: Industrial Press, 200 Madison Ave., New York, NY 10016

AMERICAN BUILDER: Simmons-Boardman Publishing Corp., 30 Church St., New York, NY 10007

AMERICAN CONCRETE INSTITUTE JOURNAL: Box 4754, Redford Station, Detroit, MI 48219

AMERICAN HOME: Curtis Publishing Co., Independence Square, Philadelphia, PA 19105

AMERICAN INSTITUTE OF ARCHITECTS JOURNAL: The Octagon, 1835 New York Ave., NW, Washington, DC 20006

AMERICAN ROOFER AND BUILDING IMPROVEMENT CONTRACTOR: Shelter Publications, 180 N. Wacker Drive, Chicago, IL 60606

AMERICAN VOCATIONAL JOURNAL: American Vocational Assn., Inc., 1510 H St., NW, Washington, DC 20005

ARCHITECT AND BUILDING NEWS: Iliffe Technical Publications, Ltd., Dorset House, Stamford St., London S.E. 1, ENGLAND

ARCHITECTURAL FORUM: American Planning and Civic Assn., 111 W. 57th St., New York, NY 10019

ARCHITECTURAL RECORD: McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, NY 10036

ASHREA JOURNAL: HEATING, REFRIGERATION AND AIR CONDITIONING: 345 E. 47th St., New York, NY 10017

AUTOMATION IN HOUSING AND SYSTEMS BUILDING NEWS: CMN Publications Div., CMN Associates, Inc., 3740 Dempster St., Skokie, IL 60076

BETTER HOMES AND GARDENS: Meridith Publishing Co., 1716 Locust St., Des Moines, IA 50303

BRICK AND CLAY RECORD: Cahners Publishing Co., 221 Columbus Ave., Boston, MA 02116

BUILDING CONSTRUCTION: Industrial Publications, Inc., 5 S. Wabash Ave., Chicago IL 60603

BUILDING DESIGN AND CONSTRUCTION: Cahners Publishing Co., Inc., 5 South Wabash Ave., Chicago, IL 60603

BUILDING PROGRESS: Stamats Publishing Co., 427 Sixth Ave., SE, Cedar Rapids, IA 52406

BUILDING RESEARCH (Building Research Institute): 1725 DeSales St., NW, Washington, DC 20036

BUILDING SUPPLY NEWS: Cahners Publishing Co., 221 Columbus Ave., Boston, MA 02116

BUILDINGS - THE CONSTRUCTION AND BUILDING MANAGEMENT JOURNAL: Stamats Publishing Co., 427 Sixth Ave., SE, Cedar Rapids, IA 52406

CENTER FOR BUILDING TECHNOLOGY NEWS: Center For Building Technology, National Bureau of Standards, U.S. Dept. of Commerce, Washington, DC 20234

CERAMIC INDUSTRY: Cahners Publishing Co., 221 Columbus Ave., Boston, MA 02116

CONCRETE CONSTRUCTION: Concrete Construction Publications, Inc., Box 444, Elmhurst, IL 60126

CONSTRUCTION DIGEST: Construction Digest, Inc., 101 E. 14th St., P.O. Box 603, Indianapolis, IN 46206

CONSTRUCTION EQUIPMENT: Cahners Publishing Co., 221 Columbus Ave., Boston, MA 02116

CONSTRUCTION METHODS AND EQUIPMENT: Editor, P.O. Box 691, Highstown, NJ 08520

CONSTRUCTION REVIEW: (U.S. Dept. of Commerce) Superintendent of Documents, Washington, DC 20402

CONSTRUCTION SPECIFIER: Specifications Institute, Inc., Dupont Circle Bldg., Washington, DC 20006

CONSTRUCTOR: THE MANAGEMENT MAGAZINE OF THE CONSTRUCTION INDUSTRY: Magazine Publishing Div., Reuben H. Donnelly Corp., 466 Lexington Ave., New York, NY 10017

CONTRACTOR-AIR CONDITIONING, HEATING, PLUMBING. COMMERCIAL, INDUSTRIAL, RESIDENTIAL: Morgan-Grampian Publishing Co., Berkshire Common., Pittsfield, MA 01201

CONTRACTOR NEWS: Hagan Publications, Inc., Bloomfield Ave., Montclair, NJ 07042

CONTRACTORS AND ENGINEERS MAGAZINE: Buttenheim Publishing Corp., 757 Third Ave., New York, NY 10017

DESIGN NEWS: The Cahners Bldg., 221 Columbus Ave., Boston, MA 02116

DYNAMIC SUPERVISION: (Pub. Twice Monthly), The Bureau of Business Practice, 24 Rope Ferry Rd., Waterford, CT 06385

ELECTRICAL PRACTICES: 1221 Avenue of the Americas, New York, NY 10020

ENERGY AND EDUCATION: NATIONAL SCIENCE TEACHER'S ASSN., 1742 Connecticut Ave., NW, Washington, DC 20009

ENERGY INSIDER: U.S. Dept. of Energy, Washington, DC 10545

ENERGY REPORTER: Federal Energy Administration, Washington, DC 20461

ENGINEERING AND CONSTRUCTION WORLD: 757 Third Ave., New York, NY 10017

ENGINEERING NEWS-RECORD: McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, NY 10036

EXCAVATING CONTRACTOR: Cummins Publishing Co., Inc., 21590 Greenfield Rd., Oak Park, MI 48237

HEATING/PIPING/AIR CONDITIONING: Reinhold Publishing Corp.,/Penton/IPC, 600 Summer St., Stamford, CT 06904

HOMEOWNERS HOW TO HANDBOOK: Times Mirror Magazines, Inc., 380 Madison Ave., New York, NY 10017

HOUSE AND HOME: McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, NY 10036

HOUSE BEAUTIFUL: Hearst Corp., 250 W. 55th St., New York, NY 10019

INSULATION REPORTER NEWSLETTER: (Quarterly) National Mineral Wool Insulation Assn., 382 Springfield Ave., Summit, NY 07901

ILLINOIS LABOR BULLETIN: Illinois Dept. of Labor, 160 N. LaSalle St., Chicago, IL 60601

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION: CCM Professional Magazines, Inc., 22 West Putnam Ave., Greenwich, CT 06830

INDUSTRIAL EDUCATION: MacMillan Professional Magazines, Inc., 77 Bedford St., Stamford, CT 06901

MAN/SOCIETY/TECHNOLOGY - A JOURNAL OF INDUSTRIAL ARTS EDUCATION: The American Industrial Arts Assn., Inc., 1201 Sixteenth St., NW, Washington, DC 20036

MATERIALS IN DESIGN ENGINEERING: Reinhold Publishing Corp., 430 Park Avenue, New York, NY 10022

MECHANIX ILLUSTRATED: Fawcett Publication, Inc., Fawcett Bldgs., Greenwich, CT 06830

MERIT SHOP CONTRACTOR: Associated Builders and Contractors, Inc., Suite 731, 1156 15th St., NW, Washington, DC 20005

MODERN MATERIALS HANDLING: Cahners Publishing Co., 221 Columbus Ave., Boston, MA 02116

NASA TECH BRIEFS: National Aeronautics and Space Administration, Washington, DC 20546

OCCUPATIONAL EDUCATION NEWS: Macmillan Professional Magazines, Inc., 77 Bedford St., Stamford, CT 06901

PERFECT HOME: Stamats Publishing Co., 427 Sixth Ave., SE, Cedar Rapids, IA 52406

PEST CONTROL: Harvest Publishing Co.,/Harcourt Brace Jovanovich, Inc., 9800 Detroit Ave., Cleveland, OH 44102

PROFESSIONAL BUILDER: Cahners Publishing Co., Inc., 5 South Wabash Ave., Chicago, IL 60603

PROFESSIONAL DECORATING AND COATING ACTION: Painting and Decorating Contractors Association of America, Inc., 7723 Lee Highway, Falls Church, VA 22046

PROGRESSIVE ARCHITECTURE: Reinhold Publishing Corp., 430 Park Ave., New York, NY 10022

SCHOOL SHOP: Prakken Publications, Inc., Box 623, 416 Longshore Dr., Ann Arbor, MI 48107

SOLAR ENGINEERING MAGAZINE: Solar Engineering Publishers, Inc., 8435 N. Stemmons Freeway, Suite 880, Dallas, TX 75247

SPECIFYING ENGINEER-MECHANICAL/ELECTRICAL SYSTEMS FOR BUILDINGS AND PLANTS: Cahners Publishing Co., Inc., 5 S. Wabash Ave., Chicago, IL 60603

STRUCTURAL CONCRETE: 14 Howick Place, London S.W. 1, ENGLAND

TEACHER: Macmillan Professional Magazines, Inc., 77 Bedford St., Stamford, CT 06901

TECHNICAL EDUCATION NEWS: Community College Division, McGraw-Hill Book Co., 1221 Avenue of the Americas, New York, NY 10020

TECHNOLOGY TODAY: Enland Publications Inc., P.O. Box 341, Canyon, TX 79015

THE FAMILY HANDYMAN: Webb Co., 1999 Shepard Rd., St. Paul, MN 55116

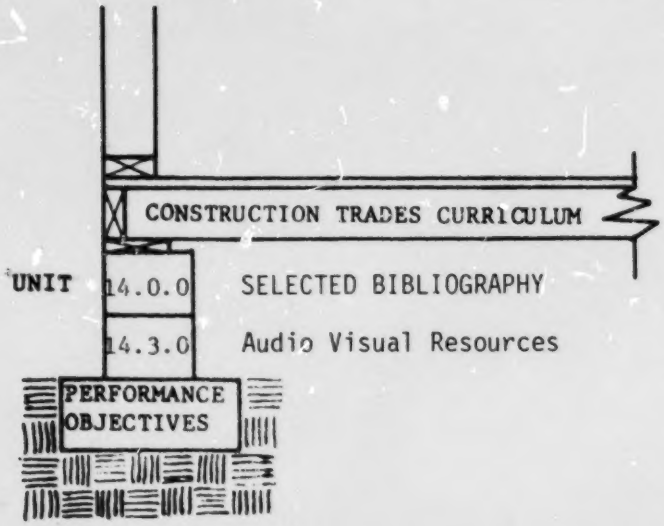
THE SOLAR JOURNAL: Box 397, Nederland, CO 84066

TILE AND ARCHITECTURAL CERAMICS MAGAZINE: Wilson-Loveton Publications, 2900 Rowena Ave., Los Angeles, CA 90039

WOOD AND WOOD PRODUCTS: Vance Publishing Corp., 59 E. Monroe St., Chicago, IL 60603

WOOD PRESERVING NEWS: American Wood Preservers Institute, 111 W. Washington St., Chicago, IL 60602

WORKBENCH: Modern Handcraft, Inc., 4251 Pennsylvania, Kansas City, MO 64111



AAVIM Engineering Center, Athens, Georgia 30601. Publications and Filmstrips:
I. Understanding Electricity and Electrical Terms.
II. Maintaining the Lighting and Wiring System.
III. Planning Water Systems For Farm And Home.

ABRAXAS FILMS, P.O. Box 186E, Capitola, CA 95010 - "Introduction to Woodshop/ Carpentry Safety". "Hand Tool Safety". "Power Equipment Safety". "Hand Held Power Tool Safety". "Radial Arm and Band Saw Safety". "Jointer Safety".

ADG Incorporated, 14504 County Road 15, Minneapolis, Minn. 55427. "Architectural Drawing"-Slide and Transparancy Sets on Details, Standards, Procedure and Terminology.

AGC of America, 1957 "E" St., N.W., Washington, DC 20006. Transparency Masters, Student and Instructor Manuals. "Commercial Carpentry."

Air Conditioning and Refrigeration Institute, 1815 North Fort Myer Dr., Arlington, VA. 22209. Slides - "A Quiet Community"-W/Cassettes on Sound Control.

Airtemp Div., Chrysler Corp., P.O. Box 1111, Dayton, OH 45401. Slides W/Cassettes Heating and Air Conditioning. "Heat Pump Story", "Installing of Room Air Conditioners". Filmstrips W/Manuals- "Air Conditioning the Electrically Heated Home". "All Electric Heat Pump". "Ducted Heat Pump Systems". "Heat Pump-Operating Comparison Cost". "Sizing and Selecting Modern Heat Pumps".

American Concrete Paving Assn., 1211 W. 22nd. St., Oak Brook, IL 60523. Films-"Fibrous Concrete Comes of Age".

American Gas Assn., 1515 Wilson Blvd., Arlington, VA 22209. Films- "The Man In Control: Earth Moving Equipment."

Am. Institute of Timber Const., 333 W. Hampden Ave., Englewood, CO 80110. Slides-"Materials: Fire Test"-(40 Slides). "Versatile Timber Construction"-(80 Slides).

American Iron and Steel Institute, 150 East Forty-Second Street, New York, NY 10017. Filmstrips-"Design Today"-W/Lecture Guide. "Contemporary Structures 1970"-W/Lecture Guide.

American Plywood Assn., 1119 A. St., Tacoma, WA 98401. Films-Construction. "In Pursuit of Happiness." "Plans: Approved." Slides-"Basic Plywood Product Information." "Plywood Construction Systems."

American Technical Society, 5608 Stony Island Ave., Chicago, IL 60637. Transparency Masters-Carpentry 1 (62 Ea.). Carpentry 2 (62 Ea.). Plumbing Masters (62 Ea.).

American Wood Preservers Assn., 1625 Eye St., N.W., Washington, DC 20006. Slides-"All Weather Wood Foundations."

Appalachian Hardwood Mfg., Inc., Room 408, N. Carolina National Bank Bldg., 164 S. Main St., High Point, NC 27260. Slide Set-"Forest Opportunities." Booklets-Appalachian Oak in Fine Furniture. Appalachian Oak in Kitchen Cabinets.

Armstrong Machine Works, Three Rivers, MI 49093. Films-"Understanding Humidification."

Army Audio-Visual Support Center, Ft. Leonardwood, MO 65473 (Southern IL), Ft. McCoy, WI 54656 (Northern IL). Films-"Carpentry: Measuring, Marking and Leveling Tools." "Carpentry: Chopping and Driving Tools." "Carpentry: Sawing and Boring Tools." "Carpentry: Planning and Chiseling Tools." Film Strip-"Concrete Construction."

Asphalt Roofing Mfg. Assn., 355 Lexington Ave., New York, NY 10017. Films-"The Perfect Combination: Asphalt Roofing."

Associated Builders & Contractors, Inc., P.O. Box 8733, Balt.-Wash. International Airport, MD 21240. Films-"Careers In Construction"-(20 Min., Color). "I Choose To Build"-(10 Min., Color). "Concrete Finishing."

Associated Instructional Materials, 866 Third Ave., New York, NY 10022. Films-"Danger Alive: Electrician." "Something Concrete: Concrete Structure Safety."

Association-Sterling Films, 866 Third Ave., New York, NY 10022. Films-"The Roof Line."

Audiovisual Center, Oklahoma State University, Stillwater, OK 74074. Films-"Careers-Construction"-(12 Min., Color). "From Trees To Lumber"-(14 Min., B.W.). "Hand Tools For Woodworking"-(22 Min., Color). "Electricity: Distribution"-(16 Min., Color). "Principles of Electricity"-(20 Min., Color). "The ABC's of Masonry Construction"-(9 Min., Color). "Delegating Work"-(9 Min., B.W.). "The Craftsman"-(7 Min., Color).

Audio Visual Center, University of Idaho, Moscow, ID 83843. Films-"From Trees To Lumber." "Miracle In Wood." "Patterns Of Time." "Magic Of Lumber."

Audio-Visual Library Service, University of Minnesota, 330 University Ave., S.E., Minneapolis, MN 55414. Films-"Heat-Its Nature and Transfer." "Knowing Woods and Their Uses." "Measuring and Squaring " "Overarm Router." "Wood Finishing." "Beveling, Mitering, Rabbeting and Dadoing." "The Hand Plane." "Planes." "Ripping and Crosscutting." "Those Fabulous Prefabs." "Building America's Homes." "Metric System."

Bergwall Productions, Inc., 839 Stewart, Garden City, NY 11530. Filmstrips/Cassettes-"Woodworking Machine Operations," (7 Color Filmstrips/Cassettes). "Electrical House Wiring Explained," (6 Color Filmstrips/Cassettes). "Residential Electrical Wiring Explained," (5 Color Filmstrips/Cassettes). "Low Voltage and Special Circuits," (4 Color Filmstrips W/Cassettes).

BFA Educational Media, 2211 Michigan Ave., Santa Monica, CA 90404. Film Loops and Films-"Woodworking Machine Operations Series"-(10 Film Series). "Woodworking Tool Series"-(6 Film Series). "Tools For Woodworking"-(8 Film W/Cassettes). "Hand Tools For Metalworking" (Film, 25 Min., Color). "Portable Electric Saws"-(Film, 22 Min., Color). "Portable Power Tools"-(Film, 17 Min., Color). "Portable Circular Saws Series"-(4 Film Series).

Bricklayer Training Slides, P.O. Box 6305, Greensboro, NC 27405. Slides-Series On Bricklaying Technology. "Basic Brick Terminology and Construction." "Basic Brick Bonds and Joints." "Miscellaneous Brick Bonds and Patterns, I." "Miscellaneous Brick Bonds and Patterns, II." "Signs and Entryways of Brick." "Brick Walls and Fences." "Fireplaces, Floors, and Interior Brickwork." "Ageless Architecture Through Brick Beauty." "Live Projects Built By High School Bricklaying Classes, 1." "Live Projects Built By High School Bricklaying Classes, 2." "Engineered Brickwork." "Municipal Buildings of Brick." "Downtown Beautification With Brick." "Brick Beauty In Church Architecture." "The Brick Value House." "Unusual Projects With Brick." "Landscaping With Brick."

Britannica Educ. Corp., 1925 N. Lynn St., Arlington, VA 22209. Film-"Energy For The Future."

Bureau of Audio-Visual Services, Univ. of Arizona, Tucson, AZ 85721. Films-"Careers-Construction"-(12 Min., Color). "From Trees To Lumber"-(14 Min., V.W.). "Hand Tools For Woodworking"-(22 Min., Color). "Electricity: Distribution"-(16 Min., Color). "Electricity: Measurement"-(12 Min., Color). "Changing Attitudes Through Communication"-(24 Min., Color). "Delegating Work"-(9 Min., B.W.). "Meanings Are in People"-(24 Min., Color).

California Redwood Association, 617 Montgomery St., San Francisco, CA 94111. Film-Logging and Lumbering. "The Forever Living Forest." "Properties and Uses Of Redwood." Booklets-Our Redwood Heritage. Redwood Lumber Guide. Redwood Lumber Grades and Uses.

California State Dept. of Education, Fiscal Officer-Order Section, 721 Capitol Mall, Sacramento, CA 95814. Transparencies-"Carpentry" (99 Transparencies W/Frames).

Cardinal Associates, Inc., Charlotte, NC 27202. Video Cassettes or Filmstrips W/Cassettes-"Bricklaying: Bed and Head Joints." "Bricklaying: Laying Bricks To A Line." "How To Use The Siphor Spray Gun."

Carrier Air Conditioning Co., TR-8, Syracuse, NY 13201. Slides W/Cassettes-Elect., Air Conditioning and Heating. "Wiring Symbols." "Wiring Diagrams." "Electric Meters." "AC Single Phase Motors, Part I." "Single Phase Motors, Part II." "Motor Protection Devices." "Trouble Shooting." "Heat Pumps." "Oil Heat." "Gas Heat." "Remote-Mounted Thermostats." "Oil Furnace Efficiency Checkout." Slides or Transparencies W/Instructor Guide. "Cooling Load Estimate." "Room Air Distribution." "Air Duct Design." "Control Principles and Methods." "Heat Rejection Equipment." Filmstrips-"Introduction To Air Conditioning Fundamentals." "Load Estimating-Air Conditioning."

Cassettes Unlimited, Roanoke, TX 76262. Cassettes-Individualized Instruction Programs. "House Wiring,"-3 Sound Filmstrips. "Carpentry."-12 Cassettes/Student Worksheets. "Plumbing"-12 Cassettes/Student Worksheets. "Heating and A.C."-12 Cassettes/Student Worksheets. "Drafting and Blueprint Reading"-12 Cassettes/Student Worksheets.

Chas. A. Bennett Co., Inc., Peoria, IL 61614. Transparency Visual Masters-Homes/Today and Tomorrow (49 Masters). Architectural Detailing (51 Masters). Film Strips W/Records or Cassettes-"Interior Decorating, A Practical Approach"-(5 Filmstrips).

Const. Products Div., W. R. Grace and Co., 62 Whittemore Ave., Cambridge, MA 02140. Films-"Insulation-It's The Top." "It's All In the Wall: Concrete Block Wall Insulation."

Coronet Films, Coronet Building, Chicago, IL 60601. Films-BW and Color 16mm Sound-"Careers In The Building Trades." "Electricity: Principles Of Safety." "Measurement of Electricity." "Refrigeration and Air Conditioning."

DCA Educational Products Inc., 4865 Stenton Ave., Philadelphia, PA 19144. Transparencies-"Building Construction." "Wood Technology." "Residential Electrical Wiring." "Woodworking Hand Tools." "Power Tools." "Bricklaying and Masonry." "Architectural Drafting." "Alternating Currents." "Electrical Machines." "Fundamental Electrical Principles." Films-"Uniplane." "The Joiner." "Overarm Router." "The Planer." "Radial Arm Saw."

Doubleday Multimedia, P.O. Box 11607, Santa Monica, CA 92705. "Woodworking"-5 Sound Film Strips. "Woodworking"-10 Super 8mm Silent Film Loops.

Education and Training Support Detachment, Naval Film Library, Great Lakes, IL 60088. Films-"Building Techniques-Foundations and Concrete". "Building Techniques-Framing, Floor Joists and Walls . "Building Techniques: Framing-Rafter Principles and Common Rafters." "Building Techniques-Interior and Exterior Trim". "Piping Fabrication-Introduction". "Piping Fabrication-Bending and Installing".

Eye Gate House, 146-01 Archer Avenue, Jamaica, NY 11435. Films-Super 8mm Cartridge. "Basic Home Electric Wiring"-9 Super 8mm, Color. "Woodworking"-12 Super 8mm, Color. Transparencies-"Architectural Drafting"-27 Transparencies W/Overlays, Multicolor.

Frank Paxton Co., 6311 St. John Ave., Kansas City, MO 64123. Wall Charts-Wood Technology-(Six Color Wall Charts)

GAF Corporation, P.O. Box 444, Portland, Oregon 97207. Transparencies: "Carpentry-The One-Story Building", (21). "Principles of Design",(24). "Home Decoration", (15).

Harvest A-V, Inc., 309 Fifth Ave., New York, NY 10016.

Honeywell, Inc., Training Administrator, 62122 Honeywell Plaza, Minneapolis, Minn. 55408. Transparencies Package-"Commercial Air Conditioning Controls". "Cooling Controls". "Electric Heat Controls". "Fundamentals of Residential Controls". "Gas Controls". "Oil Heating Controls". "Thermostats, Warm Air, and Hydronic Controls". "Electronic Air Cleaner". Slides-"Electronic Air Cleaner", Part 1-3. "Basic Electricity". Video-Cassette-"Air Conditioning: Control Fundamentals." "Basic Electricity."

Howard W. Sams and Co., Inc., 4300 W. 62nd St., Indianapolis, IN 46206. slides-"Foundations I & II"-(80 Slide W/Cassettes). "Framing I & II"-(80 Slides W/Cassettes). "Roofing"-(80 Slide W/Cassettes). "Exterior Sidewall I & II"-(80 Slide W/Cassettes). "Interior Wall Finish I & II"-(80 Slide W/Cassettes). "Kitchen Cabinet Const."-(80 Slides W/Cassettes). "Interior Trim"-(80 Slide W/Cassettes). "Floor Covering"-(80 Slide W/Cassettes).

Industrial Education Films, 1501 Pan Am Building, New York, NY 10017. Films on Personnel, Labor and Industrial Management; Supervision and Work Problems.

Instructional Materials Lab. 8 Ind. Ed. Bldg., Univ. of Missouri-Columbia, Columbia, MO 65201. Transparencies-"Fundamentals of Electricity/Electronics". Film Strips-"Laying Concrete Masonry". "Placing, Finishing and Curing Concrete Slabs". "Selecting, Proportioning, and Mixing Materials For Quality Concrete".

Instructional Media Center, Div. of Instructional Research and Service, Florida State University, Tallahassee, Florida 32306. Films-"Careers-Construction"-(12 Min., Color). "The Craftsman"-(7 Min., Color). "Jobs In The City-Construction"-(9 Min., Color).

"Jointer"-(15 Min., Color). "Knowing Woods and Their Uses"-(13 Min., B.W.). "Machine Operations-Woodwork: Scroll Saw"-(12 Min., Color). "Measuring and Squaring"-(11 Min., B.W.). "Overarm Router"-(11 Min., Color). "Radial Arm Saw"-(14 Min., Color). "Wood Finishing"-(15 Min., B.W.) "Wood: Masterpiece of Creation"-(28 Min., Color). "Danger Roofers At Work"-(19 Min., Color). "Metric System"-(13 Min., Color). "Band Saw". "Scroll Saw".

International Harvester, 10400 W. North Ave., Melrose Park, IL 60160. Slides W/Cassettes-"Construction Equipment Operator Training".

Iowa State Univ., Media Resources Center, 121 Pearson Hall, Ames, Iowa 50010. Films-"Refrigeration and Air Conditioning"-(11 Min., B.W.). "Knowing Woods and Their Uses". "New Horizons For Wood". "A House Is Built". "Fundamentals Of Earth Moving". "The ABC's of Masonry Construction". "Brick And Stone Mason". "Principles Of Quality Concrete". "How To Transport, Place, Finish, and Cure Quality Concrete".

ITT-General Controls, 801 Allen Ave., Glendale, CA 91201. Video-Cassette-Air Conditioning and Heating "Residential Controls".

Jones and Laughlin Steel Corp., 3 Gateway Center. Pittsburgh, PA 15230. Film-"A House In The Sun"-16mm, Color 13:40 min.

Lansford Publishing Co., P.O. Box 8711, San Jose, CA 95155. Slides-(200 Slide Volume) "Architecture of the Western World".

Library Filmstrip Center, 3033 Aloma Wichita KS 67211. Filmstrips-"Electricity: A Happening." "Electrical Safety." "Metric - 4 Titles."

Marshall Maintenance, 529 S. Clinton Ave., Trenton, NJ 08611. Films-"Installing Conduit and Cable". "Insulation-Covering Hot Pipes". "Laying Concrete Block". "Anchoring, Shimming and Grouting: Concrete." "The Concrete Core Drill". "Concrete Finishing". "The Concrete Saw". "Calculating Pipe Lengths: Plumbing." "Coupling Alignment." "Joining Plastic Pipe". "Pipefitting, Bell and Spigot". "Pipefitting, Cutting, Reaming and Threading". "Flashing Roof Openings".

Masonry Specialty Co., 172 Westbrook Road, New Kensington, PA 15066. Transparencies-Color W/Overlays-"Brick and Stone Masonry"-(26 W/4 Overlays). "Building Construction"-(24 W/15 Overlays). "Architectural Drafting"-(7 W/17 Overlays). Sound Filmstrips-"Masonry"-(4 Units).

McKnight Publishing Co., Bloomington, IL 61701. "Exploring The Construction Industry"-12 Filmstrips/6 Cassettes. "The World of Construction" A. Filmstrip/Cassett Set B. Transparency Set.

National Aeronautics and Space Adm., Lewis Research Center, 2100 Brookpark Rd., Cleveland, Ohio 44135. Motion Picture Catalog. NASA Technology Utilization Film List.

National Aeronautics and Space Adm., Washington, DC 20546. NASA Film List.

National Audiovisual Center (GSA), Washington, DC 20409. Films-Carpentry and Building Construction. "All Weather Wood Foundations", (10 min.,color). "Atomic Revolution In Wood". "Building Techniques-Framing, Floor Joists and Walls." "Building Techniques-Framing Hip and Valley Rafters". "Building Techniques-Framing-Rafter Principles and Common Rafters". "Building Techniques-Fundamentals of Stair Layout". "Carpentry Pt. 1, Measuring, Marking and Leveling Tools". "Carpentry P. 2, Chopping and Driving Tools". "Carpentry Pt. 3, Sawing and Boring Tools". "Carpentry Pt. 4, Planing and Chiseling Tools". "Interior and Exterior Trim". "Ripping and Crosscutting". "Basic Electricity". "Cable Surface Wiring". "Electrical Circuit Faults". "Electrical Work-Wiring: Installing Conduit". "Installing Metal Raceway". "Joining Solid Connectors". "Porcelain Protected Surface Wiring". "Power Bending Conduit". "Soldering Lugs and Splicing Stranded Conductors". "Three Wire Service Entrance". "Wire Size and Voltage Drop". "Wiring Telltale Panel". Insulation-"Covering Hot and Cold Pipe" (22 min., BW). Masonry-"Design and Control of Concrete Mixes",(35 min., C.). "Foundations and Concrete",(26 min., B.W.). Plumbing-"Constructing A Typical Household Plumbing System", (14 min., B.W.). "Cutting and Threading Pipe By Hand",(12 min.,B.W.). "Cutting and Threading Pipe On A Power Machine",(17 min., B.W.). "Cutting Threads With Taps and Dies",(20 min.,B.W.). "Cutting Internal Taper Pipe Threads".(20 min., B,W.). "Measuring Pipe Tubing and Fittings", (15 min., B.W.). Sheet Metal-"Blanking Sheet Metal On The Squaring Shears",(11 min., B.W.). "Blanking Sheet Metal With Hand Snips",(18 min.,B.W.). "Forming On A Hand Operated Brake",(17 min., B.W.). "Forming on Rotary Machines", (17 min., B.W.). "Forming With Rubber On The Hydralic Press", (11 min.,B.W.). Soldering and Brazing-"Brazing Flanges With Silver Solder", (12 min., B.W.). "Brazing Flanges With Spelter", (19 min., B.W.). "Hand Soldering", (20 min., C) "Tinning and Solder Wiping" (26 min., B.W.). "Use of Soldering Coppers", 98 min., B.W.). Concrete-"Foundations and Concrete". "Design and Control of Concrete Mixtures".

National Concrete Masonry Assn., 1800 N. Kent St., P.O. Box 9185 Rossilyn Station, Arlington, VA 22209. Films-"The ABC's of Masonry Construction". Code-American Standard Building Code For Masonry.

National Environmental Systems Contractors, Assn., 1501 Wilson Blvd. Arlington, VA 22209. Slides W/Cassetts-Heating and Air Conditioning "What Does A Blower Do In An Air Conditioning System". "The Meaning Behind Blower Rating". "Air Friction Charts". "Heat Loss From Ducts". "Air Distribution With High Sidewall Registers". "Air Distribution Vertical Discharge, Spreading Jet". "Air Distribution Vertical Discharge, Non-Spreading Jet". "Air Distribution Horizontal Discharge From A Baseboard Diffuser". "Air Distribution With Ceiling Diffusers". Development of Warm Air Heating Equipment In Past 50 Years". "Duct Systems For Forced Air Heating Systems". "How To Measure Relative Humidity". "Causes and Cures of Excess Humidity". "Causes and Cures of Excess Dryness".

National Paint, Varnish and Lacquer, Assn., Inc., 1500 Rhode Island Ave., N.W., Washington, DC.
Filmstrips-"The Wonders of Paint". Films-16mm, Color and Sound. "The House In The Middle". "Water, The Hidden Menace To Homes". "Here's How". Booklets-Armor Against Time. From The World's Four Corners.

National Particleboard Assn., 2306 Perkins Place, Silver Springs, MD 20910.
Films-"Particleboard-Out of Sight and Underfoot". Film Strip-"Knock On Wood". Booklets- Using Particleboard. The Story of Particleboard.

NIBCO, 500 Sampson Ave., Elkhart, Ind. 46514. Film Strip W/Cassettes-"Put 'Em In Right and Shootin' Service".

Northern Illinois University, Media Distribution Dept., Altgeld Hall, Rm. 114, DeKalb, IL 60115. Films-"Heat Energy and Gas Laws"-(29 Min.). "Radiant Heat"-(29 Min.). "Chisels". "Band Saw". "Woodwork: Power Drills." "Woodwork: Scroll Saw." "Measuring and Layout Tools." "Planes." "Electricity: Principles of Safety."

Payne Air Conditioning Companies, 855 Anaheim-Puente Rd., LaPuente, CA 91749. Slides-"Gas Heating"-8 Sets of Slides W/Cassettes. "Fundamentals of Refrigeration and Electrical Theory"-27 Sets of Slides W/Instructor Guide.

Portland Cement Association, Film Librarian, Old Orchard Rd., Skokie, IL 60076. Films-"Tilt-UP Construction:Concrete". "Quality Ready-Mixed Concrete". "Principles of Quality Concrete". "An Introduction To Prestressed Concrete". "How To Transport, Place, Finish, and Cure Quality Concrete". "The ABC's of Masonry Construction". "Central Plant Soil-Cement Construction". "Concrete Calvert Pipe Construction Practices". "Constructing A Prestressed Concrete Building". "Stucco and Plaster-New Dimensions in Oldest Building Art". Slides-"All Weather Masonry Construction"-(20 ea., 1969). "Concrete Durability"-(35 ea., 1969). "Concrete Floor Systems, Part I"-(49 ea., 1971)."Concrete Masonry Construction In Cold Weather"-(14 ea., 1957). "Concrete Placing By Pumping"-(33 ea., 1970). "Concrete Residential Systems"-(18 ea., 1973). "Concrete Tools and Finishing"-(50 ea., 1974). "Control Joints For Concrete Masonry"-(27 ea., 1957). "Door and Window Openings For Concrete Masonry Buildings"-(21 ea., 1968). "Durable Concrete"-(18 ea., 1963). "Finishing Exposed Aggregate"-(62 ea., 1964). "I/D Floors and Roofs"-(40 ea., 1973). "Masonry Load Bearing Walls"-(21 ea., 1970). "Mortars For Concrete Masonry Walls"-(5 ea., 1957). "Mr. Quality Concrete"-(40 ea., 1969). "Quality Concrete Masonry Const. Details"-(71 ea., 1968). "Residential Basements-Cast-In-Place"-(13 ea., 1973). "Soil-Cement Construction"-(43 ea.,1969). "Structural Slide Lecture"-(80 ea.). "Tilt-Up Concrete Walls, Pts. I & II"-(70 ea., 1971).

Power Tool Institute, 1803 S. Busse Rd., Mount Prospect, IL 60056. Wall Charts-On The Job Safety Rules For Power Tools. On The Job Power Tool Safety Maintenance. Slide Presentation-"On The Job Safety-Carpenter", 41 slides. "On The Job Safety-Electrician", 41 slides.

Prakken Publications, Inc., 416 Longshore Drive, Ann Arbor, Mich. 48107. Transparencies-"Architectural Drafting",(6/w overlays).

Reynolds Metals Co., P.O. Box 27003, Richmond, VA 23261. Films-"The House That Recycling Built".

Revere Copper and Brass, Inc., 605 Third Ave., New York, NY 10017. Films-"Copper Tubing In Building Construction".

RMI Media Productions, Inc., 701 Westport Road, Kansas City, MO 64111. Filmstrips W/Cassettes-"Introduction To Woodworking". "Hand Tools". "Power Tools". "Construction".

Robert J. Brady Co., Bowie, MD 20715. Filmstrips W/Cassettes or Slides W/Cassettes - Light Commercial Architecture: "Elements of Design." "Foundations and Concrete Work." "Steel and Concrete Structures." "Wood Structures." "Exteriors." "Interiors." Residential Architecture: "Excavation and Masonry." "Framing A House." "Exterior Finishing." "Utility Service Systems." "Interior Finishing."

Safety Manuals Const. Industry, Manufacturers Assn., 111 E. Wisconsin Ave., Milwaukee, Wisc. 53202 Slides-"Wheel-Type Loader/Dozer".

Scholarly Audio-Visuals, Inc., 5 Beekman St., New York, NY 10038. Slidesets: "Habitat"-(48 slides). "Architectural Terms"-(50 slides). "Architecture"-(100 slides). "Architecture"-Detail and Decoration (100 slides). "The Story of Environmental Color"-(43 slides). "Functions of Color"-(47 slides). "Pioneers of Color In Modern Architecture"-(40 slides). "Master Builders"-(39 slides). "European Architecture"-(33 slides). Interior Design: "Modern Lighting Design"-(12 slides). "Modern Storage Design"-(12 slides). "Modern Kitchen Equip."-(12 slides). "Floors and Walls"-(12 slides). "Interior Design"-(12 slides).

Scope Productions, 1461 W. Shaw Ave., Fresno, CA 93705. Single-Concept Film Cartridges-8mm and Super 8mm. Architectural Industrial Design: "Architectural Scale Models". "Human Nest-Historical Evolution". "Human Nest-Living Areas". "Human Nest-Terrain". "Human Nest-Multiple Dwellings". "Architectural Surface Treatment". Home Decorating: "Space Arrangement." "Surface Treatment."

Small Sales Co., P.O. Box 7803, Boise, ID 83707. Filmstrips W/Cassettes-7 Filmstrips "Building A Model House".

Society For Visual Education, Inc., 1345 Diversary Parkway, Chicago, IL 60614. Filmstrips-How We Get Our Homes (set of 4) "Planning The Home". "Building The Foundation". "Building The Shell". "Finishing The Home".

Soiltest, Inc., 2205 Lee St., Evanston, IL 60202. Film Strip-"Failures in Foundations".

Stanley Tools Educational Dept., 600 Myrtle St., New Britain, Conn. 06050. Woodworking Tools and Their Usage: Films-16MM Sound, 8 MM Sound and 8 MM Loop Films: "The Router", "The Dovetail Fixture", "How To Hang A Door", "Measuring Tools", "How To Use Saws", How To Use Planes", "How To Use Hammers", "Boring Tools", "Chisels and Gouges".

State Univ. College At Buffalo, Media Library, Communications Center 102. 1300 Elmwood Ave., Buffalo, NY 14222. Films - "Hand Tools for Woodworking".

Swani Publishing Co., Box 248, Roscoe, IL 61073. Films- 16mm or Super 8 "Discover...Why Metrics"-14min., color.

Symons Manufacturing Co., 200 E. Touhy Ave., Des Plaines, IL 60018. Films "Facts For Forming The Future: Concrete Forming." "Three Forming Systems: Concrete Forming."

The Curriculum and Instructional Materials Center, 1515 W. Sixth Ave., Stillwater, OK 74074. Transparencies-"Residential Carpentry"-(124 Transparencies).

The National Assn. of Home Builders, 15th and M Streets, N.W., Washington, DC 20005. Slides W/Cassettes - "Elements of the Land Plan" (130 color slides). "Challenge To Change," (195 Color Slides). "Cost Effective Residential Development Standards", (75 color slides). "Residential Streets", (75 color slides). "Residential Storm Water Management", (75 color slides) Film-"The PUD Film". "Sensible Growth In Our Community".

The Pennsylvania State Univ., Audio-Visual Services, 7 Willard Bldg., Univ. Park, PA 16802. Films-"The Dovetail Fixture". "Joining and Gluing". "Knowing Woods and Their Uses". "Wood Finishing". "Reinforced Concrete Construction". "How To Transport, Place, Finish, and Cure Quality Concrete". "Building Lines". "Fundamentals of Land Surveying".

The University of Iowa, Audio-Visual Center Media Library, C-5 East Hall, Iowa City, Iowa 52242. Films-"Refrigeration and Air Conditioning"-(11 min., B.W.). "Beams and Frames"-Carpentry.

The Walden Film Corp., 39 East 32st. St., New York, NY 10016. Single Concept Film Loops-"materials". "Saws". "Fastening With Nails". "Painting Wood".

The 2000 Co., Box 1055, Costa Mesa, CA 92627. Filmstrips-10 Filmstrips W/Cassettes. "Intro. To Woodshop/Carpentry Safety".

Thompson-Mitchell and Associates, 2996 Grandview Ave., N.E., Roberts Bldg., Atlanta, GA 30305. Transparencies-"Basic Air Conditioning"-(117 Transparencies). "Building Construction"-(103 Transparencies). Films-"How To Hang A Door". "How To Use Planes". "The Dovetail Fixture". "The Router". "Down To Earth: Electrical Safety On Building Sites." Film Strips-"Elements of Effective Teaching". "How To Teach Tasks, Skills or Concepts". "Supervisor As An Instructor Series".

United Transparencies, Inc., Box 688, Binghamton, NY 13902. Transparencies - "Building Construction" (103 Transparencies).

Universal Form Clamp Co., 1238 N. Kostner Ave., Chicago, IL 60651. Films- "The Amazing Mr. Uni-Form: Concrete Forming."

University of Colorado, Bureau of Audiovisual Instruction, Boulder, CO 80302 Films-16mm sound: "Lumber For Homes"-(20 min.) "Principles of Electricity"-(20 min. Color). "Saw Timber"-(20 min. Color). "This is Lumber"-(19 min. Color).

Univ. of Missouri-Columbia, Extension Division, Audio-Visual and Communications Service, 203 Whitten Hall, Columbia, MO 65201. Films-"Heat Energy And Gas Laws"-(29 min.). "Radiant Heat"-(29 min.). "Drilling, Boring And Reaming"-(10 min.). "The Full Treatment-Pressure Treated Wood". "Joining And Gluing". "Knowing Woods And Their Uses". "Laminating Timber". "Measuring And Layout Tools" "Measuring And Squaring". "New Horizons For Wood". "Planes". "Stress Grading Timber". "Wood Finishing". "Electrical Pressure And Current". "The ABC's Of Masonry Construction". "How To Make Quality Concrete".

Univ. Of Texas At Austin, Visual Instruction Bureau, University Station, Austin, Texas 78712. Films-"Building Techniques-Fundamentals of Stair Layout". "Interior and Exterior Trim". "Principles of Quality Concrete". "Foundations and Concrete".

Visual Aids Service, University of Illinois, Div. of Extension Service, 1325 South Oak St., Champaign, IL 61820. Film-"Building Techniques: Framing-Rafter Principles and Common Rafters". "Building Techniques-Foundations and Concrete". "Carpentry: Construction of a Stairway." "Carpentry: Roof Construction-The Common Rafter". "Center Gliding of Drawer". "Chisels". "Face Planing Uneven Surfaces". "Woodwork: Hand Saws." "Woodwork: Wood Finishes." "The Hand Plane." "Hand Tool for Woodworking." "Joining and Gluing". "Knowing Woods and Their Uses." "Laminating Timber." "Laying Out and Forming Plywood". "Measuring and Squaring". "Planning Rough Surfaces To Dimensions". "Using The Shaper To Make Drawers". "Using The Shaper To Make Panel Drawers". "Electrical Work: Wiring-Installing Conduit". "Electrical Work: Wiring-Preparing Old Buildings For Wiring. "Electrical Distribution". "Three-Wire Electrical Service Entrance". "Wire Size and Voltage Drop". "Concrete: Proportioning." "Brick and Stone Mason". "Painting A Panelled Door". "Paperhanging-Application". "Paperhanging-Preparation". "Repainting A Frame Building". "Cutting Threads With Taps and Dies". "Plumbing: Pipe Joints." "Plumbing: Traps and Vents". "Claw Hammer and Nail Set". "Hammers and Nails". "Handsawing". "Safety In The Shop-Power Tools".

Visual Products, 3M Company, 2501 Hudson Road, St. Paul, MN 55229. Transparencies-"Roof Framing Part I and II", Transparency Set. "Staircase Construction", Transparency Set. "Interior Trim." Transparency Set. "Exterior Trim", Transparency Set. "Basic Wiring", Transparency Set. "House Framing Part I-II", Transparency Set.

Voc. Educ. Media Center, 109 Freeman Hall, Clemson University, Clemson, SC 29631. Transparencies-"Building Construction Equipment"-(20 ea., 1970). "Electricity For Trades and Industry"-(64 ea.). "Brick Masonry Program" (77 ea., 1968).

Vocational Instructional Services, Vocational-Industrial Educ., F.E. Box 182, Texas A&M University, College Station, Texas 77843. Transparencies- "Building Trades-Part I"-(99 ea.). "Building Trades-Part II"-(100 ea.). "Electrical Trades"-(143 ea.).

Webster Div., McGraw-Hill Book Co., Manchester Road, Manchester, MO 63011. Architectural Drafting Transparancies Sets. "Area Planning". "Basic Architectural Plans". "Technical Plans". "Creative Architectural Drafting".

Western Publishing Education, 1220 Mound Ave., Racine, Wisconsin 53404. "Color Changes A Room's Character", Transparencies I, II, and III/overlays.

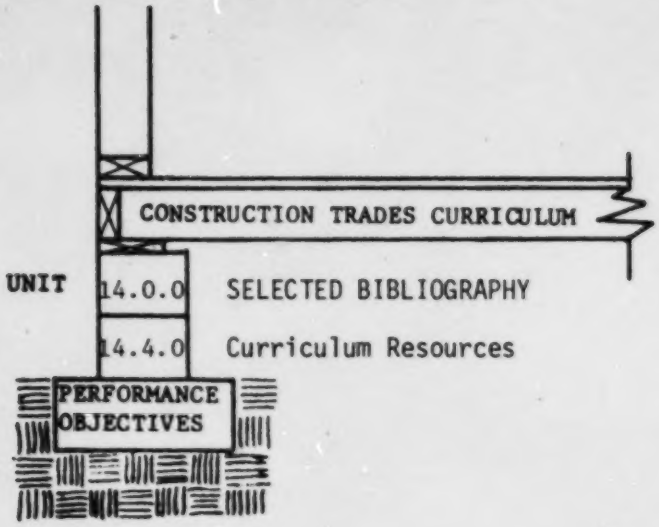
Western Wood Products Assn., Yeon Building, Portland, OR 97204. Slide Presentation-Plen-Wood Slide Show "How To Build A Better Home...For Less".

Westinghouse Central Residential Air-Conditioning Div., 5005 Interstate Dr., North, Norman, OK 73069. Slides W/Cassettes-Basic Elect., Air Cond., Heating "Basic Electricity". "Gas Furnace Electric Circuit". "Cooling". "Total Comfort Electric Circuit". "Electrical Trouble Shooting". "HI/RE/LI Electrical Circuit". "Gas Furnace Installation". "Gas Furnace Operation". "Gas Furnace Servicing". "Human Comfort". "Heat Flow Characteristics". "Making A Survey". "Sketching The House". "Calculating The Load". "Room Air Requirements". "Equipment and System Selection". "Air Distribution Selection". "Sizing The Ductwork". "Introduction To The Heat Pump". "Conventional Heat Pump". "HI/RE/LI Heat Pump". "HI/RE/LI Solid State Defrost".

Whirlpool Corp., Whirlpool Drive, LaPorte, Indiana 46350. Filmstrip W/Cassette "Basics of Room Air Conditioners".

Wire Reinforcing Institute, 7900 Westpark Dr., McLean, VA 22101. Films-"How To Place Structural Fabric: Concrete Reinforcing."

Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106. Microfilm-35mm and 16mm. Applied Science and Technology Periodicals and Journals. Request Current Listing.



AGC of America, 1957 "E" St., NW., Washington, D.C. 20006
Curriculum Guide-Student and Instructor Manuals Commercial Carpentry.

Air Conditioning and Refrigeration Inst.,1815 North Fort Myer Drive, Arlington, VA. 22209
Course Outline-Air Conditioning, Heating and Refrigeration. Bibliography of Curriculum and Training Aids.

Alabama State Dept. of Education, Vocational Technology and Higher Education., Montgomery, Alabama 36104.
Curriculum Guide-Measurable Carpentry and Cabinet Making Objectives for Post-Secondary Technical Institutes/Technical Colleges. 1973.

American Plywood Assn. 1119 A St., Tacoma, Washington 98401
Student Guide-Plywood Residential Construction Guide.

American Welding Society, Education Operations, 2501 NW 7th. St., Miami, Fla. 33215
Instruction Mannuals-Brazing Manual, 1963., Braze Safely, 1971., Soldering Manual, 1959.

Arizona Dept. of Education, Div. of Career and Vocational Educ., 1535 W. Jefferson St., Phoenix, Arizona 85007
Curriculum Guide-Building Trades I Course Outline. 1974.

Bureau of Voc-Tech Educ., Div. of Trade and Industry, State Office Bldg. Frankfort, KY 40601
Curriculum Guide-Carpentry Course of Study. 1968.

Bureau of Voc-Tech Schools Curriculum Center, Div. of Vocational Education, State Office Bldg., Rm. 336, Hartford, Conn. 06115
Teacher's Manual Of Definitions-Glossary of Terms For The Building Trades.

California State Dept. of Education, Fiscal Officer-Order Section, 721 Capitol Mall, Sacramento, Calif. 95814
Curriculum Material-Apprenticeship Training Cement Masons-Manual, 1968. Electric Wiring-Parts I-IV. Wallcovering-Manual. Plastering-Manual.

Roofing, Parts I and II-Manuals; Sheet Metal Worker-Parts I-VI. Floor Covering Apprenticeship, Parts I and II-Manuals. Glazing-Manual.; Tilesetting-Manual.; Surveying-Manual.; Carpentry, Volumes I, II and III-Workbooks.; Cabinet Making and Millwork,; Parts I, II and III-Workbooks.; Dry Wall Construction, Parts I and II-Workbooks. Dry Wall Taping-Manual.; Heavy Equipment and Its Uses-Workbook.; Special Systems and Rigging-Workbook.; Painting and Decorating, Parts I-III, Manuals.

Capital Area Career Center, 611 Hagadom Rd., Mason, Michigan 48854
Curriculum Guide-Performance-Based Carpenter Curriculum Carpentry Job Knowledges, Job Skills, Performance Objectives and Learning Modules. 1972.

Chief of Voc. Training, Office of Program Development, Job Corps, Manpower Administration, U W. Dept. of Labor, 601 D Street, NW, Washington, DC 20217
Training Guides-Occupational Training Guides. 1974; Training Achievement Records. 1974.

Concrete Reinforcing Steel Institute, 180 N. LaSalle St., Rm. 2110, Chicago, IL 60601
On-The-Job Training Materials-Reinforcing Bar Detailing: Concrete.

Connecticut State Dept. of Educ.; Div. of Vocational Educ.; Hartford, Conn. 06115
Curriculum Guide-Carpentry Progress Record, Theory Outline and Job Assignment Plan Book. 1973. Carpentry Trade Analysis. 1973.

Continuing Educ. Publications, Extension Annex, Corvallis, Oregon 97331
Learning Packets-Construction Cluster, 150 Packets. Construction Learning Packets.

Curriculum Coordinating Unit, Mississippi State Univ., P.O. Drawer DX, Mississippi State, Miss. 39762
Teachers Guide-Vocational Refrigeration, Air Conditioning and Heating.

Day, Gerald F. and Herschbach, Dennis R., Editors. Resource Guide For Performance-Based Carpentry Instruction. College Park, MD: The Bureau of Educational Research and Field Services, College of Educ., University of Maryland, 1974.

Day, Gerald F., and Tucker, John. Carpentry Performance Objectives. College Park, MD: The Center For Research And Industrial Materials, University of Maryland, 1976.

Department of Health, Education and Welfare, Bureau of Adult, Vocational, and Library Programs,; Div. of Voc.-Tech. Educ., Washington, D.C. 20202
Curriculum Guide-Architectural and Building Construction Technology, A Suggested 2-Year Post High School Curriculum. Tech. Ed. Program Series No.3.

Didactic Systems, Inc., P.O. Box 457, Crawford, N.J. 07016
Course Outline Package-How To Improve Your Supervisory Training Skills. Managing Human Relations. Role Playing-Simulation Games, The Construction

Game; Low Bidder; Lumber Yard Game; The Wiring Diagram; The Instruction Game.

Div. of Community Colleges and Voc. Educ.; Oregon Board of Education, Public Services Building, Salem, Oregon 97310
Curriculum Guide-Electrical Theory, 1970.

East Central Curriculum Management Center, Illinois Office of Education, Dept. of Adult, Vocational and Technical Education, 100 N. First St., E-426, Springfield, IL 62777
ECCMC Regional Annotated Bibliography 1976-77; Orientation To Industrial Oriented Occupations; A Carpentry Manual For Special Need Students, 1977.

Electrical Practice, 1221 Avenue of the Americas, New York, N.Y. 10020
Curriculum Materials-Learning The Electrical Code.

Electric and Gas Industries Assn., 1355 Market St., San Francisco, CA 94103
Programmed Self-Study Course-Basic Electricity.

Engineering Extension Service, Texas A&M University, Box 236, F.E., College Station, Texas 77843
Curriculum Materials-Teacher Training Manuals and Outlines. Voc.-Industrial Teacher Training Guides; Voc.-Ind. Course Outlines; Electrical Trades; Metal Trades; Structural Drafting; Refrigeration and Air Conditioning; Drafting; General Building Trades.

General Electric Co., 1 River Rd., Bldg. 23, Rm. 288, Schenectady, N.Y. 12345
Curriculum Course Packet-Effective Management Through Work Planning. Effective Communications-4 Volume Series.

General Electric-Lamp Div., 2800 NW Nela St., Portland, OR 97210
Student Workbook-Interior Lighting Design Workbook.

Honeywell, Inc., ATTN: Training Adm., 62122 Honeywell Plaze, Minneapolis, MN 55408
Curriculum Kit-Instructor Manual, Transparencies and Student Workbook Commercial Air Conditioning Controls; Cooling Controls; Electric Heat Controls; Fundamentals of Residential Controls; Gas Controls; Oil Heating Controls; Thermostats, Warm Air, and Hydronic Controls.
Slides-Electronic Air Cleaner; Part 1-3
Video-Cassette-Air Conditioning: Control Fundamentals.

Industrial Educ. Dept., J.M. Patterson Bldg., Univ. of Maryland, College Park, Maryland 20741
Curriculum Materials-Instructional Plans For The Construction Cluster, 1967.

Instructional Materials Laboratory, 10 Industrial Educ. Bldg., Univ. of Missouri-Columbia, Columbia, MO 65201
Teachers Guides-Lesson Plan Format - Air Conditioning, Part I. Refrigeration, Part II.; Building Construction, Vol. II.; Building Construction Study Guide, Vol. II.; Fundamentals of Electricity/Electronics (Section A & B).; Blueprint Reading For Welders; Gas Tungsten Arc and

Gas Metal Arc Welding; Oxyacetylene Welding, 1971; Resistance and Special Welding Processes, 1972; Shielded Metal Arc Welding, 1972.
Study Guide- Welding Technology, 1970.
Transparencies-Basic Air Conditioning.
Curriculum Guides- Building Construction, Vol. I; Building Construction Study Guide, Vol. I.

Instructional Materials Laboratory, 1885 Neil Ave., The Ohio State University, Columbus, Ohio 43210
Curriculum Guide-Occupational Analysis-Carpentry, 1974; Residential Construction: Carpentry Trade Analysis, 1974.
Apprenticeship Training Guides-Asbestos Workers: Instructor's and Learner's Manual; Bricklaying: Learner's Manual; Bricklaying II: Learner's Manual; Basic Electricity: Instructor's and Learner's Manual; Basic Instructional Unit For The Electrical Trade; Residential Wiring: Learner's Manual; Training Plans and Progress Records- Bricklaying; Cabinet Making, Carpentry, Carpet and Linoleum, Drafting, Electrical Wiring, Painting and Decorating, Plumbing, Residential Wiring, Sheet Metal Work, Welding.
Instructor's Manual W/Lesson Plans-Basic Electricity; Residential Wiring.
Curriculum Package- Human Relations Training; Preparation of Occupational Instructors.
Instructor Training- Collecting and Classifying Instructional Materials; Developing and Using Objective Tests; Tradesman-Instructor Training; Teaching Methods and Techniques in Trade and Industrial Education-Unit "C" Series; Selection and Organization of Subject Matter In Trade and Industrial Education-Unit "D" Series.

Instructional Materials Services, Div. of Extension, Univ. of Texas at Austin, Austin, Texas 78712
Student Study Guide- Refrigeration and Air Conditioning, 1969; Cabinet Making; Tools For Woodworking Trades, 1972; Basic Electricity (8 Units), Instructor Guides; Commercial Electrician, 1969; Conduit Bending For Wiremen; Residential Wiring, 1970; Bricklayer and Stonemason Trades, 1973; Plumber Study Guide, 1969; LP-Gas Training Manuals, Book I-IV; Sheet Metal Worker, 1966.

International Assn. of Walls and Ceilings Contractors,1775 Church St., NW., Washington, D.C. 20036
Instruction Manual-Ceiling Systems Manual: Air Distribution and Lighting.

International Harvester, 10400 W. North Ave., Melrose Park, IL 60160
Student Guide-Basic Estimating-Earthmoving; Estimating Earthmoving Equipment: Comput-O-Matic. Earthmoving Systems.

Learn Fast Systems, R.D. #2, Box 429, Yardville, N.J. 08620
Performance Objectives and Job Competencies- Performance Objectives For Carpentry; Job Competency List For Carpentry.

Lux, Donald G. and Ray, Willis E. The World Of Construction. Bloomington, IL.: McKnight and McKnight Pub. Co. 1970.

Maine Dept. of Educ., Bureau of Voc. Educ., Agusta, Maine 04330
Curriculum Guide-A Curriculum Guide For Carpentry Units Designed For Construction And Maintenance Trades, 1970.

Manpower Development and Training Dept., National Assn. of Home Builders, 15th and M Streets, NW., Washington, D.C. 20005
Apprenticeship Training- Incentive Apprenticeship Program In Carpentry, 1974.

McKnight Publishing Co., Box 2854, Bloomington, IL 61701
Teachers Guide-Teachers Guide For Exploring The Construction Industry. Teachers Guide For The World of Construction.

Mississippi State Univ., Research and Curriculum Unit, For Voc-Tech Educ. Mississippi State, Mississippi 39763
Curriculum Guide-Secondary Vocational Building Trades, 1971.

National Assn. of Electrical Distributors, 600 Madison Ave., New York, NY 10022
Programmed Instruction-Self Teaching Books; Basic Electricity (Series of Four Books).

National Assn. of Home Builders, Fifteenth and M Streets, NW, Washington, D. C. 20005
Curriculum Materials-Insulation Manual-Homes and Apartments.

National Audiovisual Center, GSA, Washington, D.C. 20409
Instructor's Manual W/Slide Presentation-Construction Safety and Health Training Course, 466 Slides. Narrative Construction Safety and Health Training Course, 290 Slides.

National Concrete Masonry Assn., 1800 N. Kent St., P.O.Box 9185 Rosslyn Station, Arlington, VA. 22209
Study Guide-Student Manual, Instructor's Guide Concrete Masonry Construction.

Nat. Environmental Systems, Contractors, Assn., 1501 Wilson Blvd., Arlington, VA. 22209
Course Outline- Basic Refrigeration; Automatic Controls For Heating and Air Conditioning Systems. Instruction Manual-Adjusting Air Conditioning Systems For Maximum Comfort. Introduction To The Installation of Residential Ducted Heating and Air Conditioning Systems. NESCA/SMACNA Standards Notebook. Principles of Air Conditioning. Recommended Installation Practices and Recommended Municipal Code. What Makes A Good Air Conditioning System.

National Fire Protection Assn., Publications Sales Dept., 470 Atlantic Ave. Boston, Mass. 02210
Instruction Manual-NFPA Air Conditioning and Ventilating Systems Manual. Installation of Oil Burning Equipment Manual. Warm Air Heating and Air Conditioning Systems.

National Forest Products Assn., 1619 Massachusetts Ave., NW., Washington, D.C. 20036
Student Guide- Manual For House Framing.

National Laboratory For The Advancement of Education, The Aerospace Educ. Foundation. 1750 Pennsylvania Ave., NW., Washington, D.C. 20006
Curriculum Guides-Apprentice Carpenter. (Lesson Plans, Study Guide and Workbook). 1971.

National Oak Flooring Manufacturers Assn., Inc. 814 Sterick Bldg., Memphis Tenn. 38103
Student Guide Handbook-Hardwood Flooring Handbook.

National Occupational Competency Testing Institute, Educational Testing Service, Princeton, N.J. 08540
Testing-Scope of the Written and Performance Test in Carpentry, 1974.

Nebraska Dept. of Educ., Div. of Vocational Educ., 233 S. Tenth St., Lincoln, Nebraska 68508
Curriculum Guide-Building Trades Guide: Carpentry, 1972.

Nelms, H. F. "The Educational Needs of Secondary School Building Construction Teachers In Illinois With Implications For Program Development In Teacher Education Institutions." Unpublished Ed.D. Dissertation, University of Northern Colorado, 1976.

New Jersey Voc.-Tech. Curriculum Lab, Rutgers University, 4103 Kilmer Campus, New Brusnwick, N.J. 08903
Curriculum Guide-Basic Comfort Heating Principles. Electricity In Refrigeration And Air Conditioning, Parts I and II. Carpentry 1-House Framing. Principles For Electric Wiring. Course Outlines- Building Construction: Related Drawing, Blueprint Reading. Building Construction: Related Mathematics. Building Construction: Skills Outline. Carpentry And Cabinet Making, 1965.

New Mexico Dept. of Educ., Voc-Tech Division, Santa Fe, New Mexico 87501
Course Outline-A Suggested Course Outline For Building Trades.

NIBCO, 500 Sampson Ave. Elkhart, Ind. 46514
Instruction Manual W/Teachers Guide-Theory and Technique of Soldering and Brazing of Piping Systems, 1971.

Oregon-Washington Carpenters, Employers Apprenticeship and Training Trust, Suite 115, Morquam Plaza, 2525 Southwest 3rd Ave., Portland, OR 97201
Course Outlines-Carpentry Apprenticeship Related Training And Manipulative Curriculum. 1974.

Painting and Decorating Contractors of America, 7223 Lee Highway, Falls Church, VA, 22046
Study Guide and Workbook- Painting and Decorating: Craftsman's Manual and Textbook.

Personnel Development Unit, Bureau of Vocational Educ., 2035 Capitol Plaza Tower, Frankfort, KY 40601
Vocational-Technical Education Consortium of States (V-Tecs) Curriculum Project: Carpentry.

Portland Cement Assn., Old Orchard Rd., Skokie, IL 60076
Instructor's Guide-Concrete Technology.

Potomac Edison, Downsville Pike, Hagerstown, MD 21740
Curriculum Materials-Electrical Fundamentals And Residential Wiring.

Power Tool Institute, 1803 S. Busse Rd., Mount Prospect, IL 60056
Program Guide-On-The-Job Safety For Power Tools.

Small Homes Council-Building Research Council, University of Illinois, One East Saint Mary's Road, Champaign, IL 61820
Teaching Unit On Kitchen Planning-108 2X2 Slides, Teacher's Manual and Student Guide.

Smith, Alfred A.; Lockett, Ward R.; and Bateman, William L. "A Course Of Study In Construction." Industrial Arts And Vocational Education Magazine, December, 1970, pp. 15-18.

Southern Union Gas Co., Fidelity Union Tower, Dallas, TX 75201
Training Manual-Backhoe Tractor Operation.

State Department of Education, Div. of Vocational Education, Trade and Industrial Educ. Service, Richmond, VA 23216
Curriculum Guide-Vocational Building Trades Curriculum Guide, 1972.
Vocational Carpentry Curriculum Guide, 1973.

Texas Educ. Agency, 201 E. 11th St., Austin, TX 78710
Curriculum Guide-Job Cluster Curriculum For Construction Occupations At The High School Level, 1975.

The Aluminum Assn., 750 Third Ave., New York, N.Y. 10017
Student Manual-Underground Conductors Electrical Manual.

The Curriculum and Instructional Materials Center, 1515 West Sixth Ave., Stillwater, OK. 74074
Curriculum Guides-Commercial Carpentry, 1974. Residential Construction, 1973

The Oregon Board of Educ., State of Oregon Dept. of Educ., 942 Lancaster Dr., NE, Salem, Oregon 97310
Curriculum Guide-Building Construction:Occupational Cluster Guide, 1972.

The University of the State of New York State Education Dept., Bureau of Secondary Curriculum Development, Albany, N.Y. 12224
Building Industries Occupations Syllabus, 1971.

Thompson-Mitchell & Associates, 2996 Grandview Ave., NE, Roberts Bldg., Atlanta, GA 30305
Study Guide- Job Instruction: The Communication of Ability. Preparing Instructional Objectives.

Trade and Industrial Educ., Bureau of Vocational Educ., Pennsylvania Dept. of Educ., Harrisburg, PA 17126
Curriculum Guide-Course of Study for Carpentry, 1973.

Trade and Industrial Educ. Service, Voc. Educ. Division, Ohio State Dept. of Educ., Columbus, Ohio 43215
Curriculum Materials-Roofers Learner's Manual.

Utah State Board of Educ., 1400 Univ. Club Bldg. 136 E. South Temple St., Salt Lake City, Utah 84111
Curriculum Guide-Building Construction: An Integrated Secondary-Post Secondary Curriculum Guide, 1973.

Vocational Curriculum Management Center; Trade, Industrial, and Technical Educ. Section, 216 Old Capitol Bldg., Olympia, Washington 98504
Curriculum Guide-Carpentry Apprenticeship Related Training, 1974. (4 Year Course of Study: 4 Instructor's Manuals)

Vocational Educ. Media Center, 109 Freeman Hall, Clemson University, Clemson, S.C. 29631
Curriculum Guide-Masonry Curriculum Guide For Brick Masonry Program, 1968.
Teachers Guide- Shop Safety, 1968.

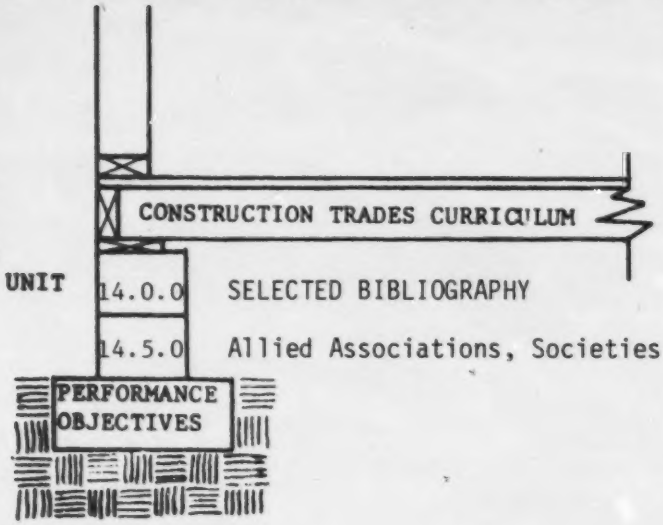
Vocational Industrial Service, West Virginia State Board of Educ., Bureau of Voc-Tech and Adult Educ., Charleston, WV 25305
Curriculum Guide-Building Construction. Competency-Based Vocational Education Curriculum Project For Boone County Vocational Center, 1973.

Vocational Instructional Services, Voc.-Industrial Educ., F.E. Box 182, Texas A&M University, College Station, TX 77843
Basic Course Outlines- Sheet Metal; Building Trades; Electrical Trades; Bricklaying; Refrigeration and Air Conditioning; Study Guides- Carpentry: Supervised Study Guide For Related Instruction, 1973. A Suggested Basic Course Outline For Building Trades, 1970. (Carpentry and Painting)

Washington State Univ., College of Educ., Dept. of Industrial Educ., Pullman, Washington 99163
Curriculum Materials-Identification of Task and Knowledge Clusters Associated With Performance of Major Types of Building Trades Work. 1966.

Whirlpool Corp., Tech. Training Center, Dept. 1-58, Benton Harbor, MI 49022
Vocational Training Program Materials-Basic Electricity For Appliances. Central Air Conditioning and Heat Pump Service. Range Program (Gas, Electric, Microwave).

White-Rodgers Div., Emerson Electric Co., 9797 Reavis Rd., St. Louis, MO 63123
Study Guide-Basic Electricity.



Adhesives Manufactures Assn. of America, 441 Lexington Ave., New York, NY 10017

Acoustical and Insulation Materials Association, 205 West Touhy Ave., Park Ridge, IL 60068

Air-Conditioning and Refrigeration Institute, 1815 N. Fort Myer Drive, Arlington, VA. 22209

American Association of Nurserymen, Suite 835, Southern Bldg. Washington, D.C. 20005

American Building Contractors Association, 3345 Wilshire Blvd., Los Angeles, California 90010

American Concrete Institute, P.O. Box 4754, Redford Sta. Detroit, Mich. 48219

American Forest Institute, 1619 Massachusetts Ave., NW, Washington, DC 20036

American Hardboard Association, 20 N. Wacker Drive., Chicago, IL 60606

American Hardware Manufactures Assn., 2130 Keith Bldg., Cleveland, Ohio 44115

American Home Lighting Institute, 230 N. Michigan Ave., Chicago, IL 60601

American Institute of Architects, 1785 Massachusetts Ave., N.W., Washington, D.C. 20036

American Institute of Constructors, 1140 N.W. 63rd St., Suite 511, Oklahoma City, OK 73116

American Institute of Planners, Rm. 800, 917 15th St., N.W., Washington, DC 20005

American Institute of Steel Constructors, Inc., 101 Park Ave. New York, N.Y. 10017

American Institute of Timber Construction, 333 W. Hampden Ave., Englewood, Colorado, 80110

American Iron and Steel Institute, 150 E. 42nd St., New York, N.Y. 10017

American Mutual Insurance Alliance, 20 North Wacker Drive, Chicago, IL 60606

American National Metric Council, 1625 Massachusetts Ave., N.W., Washington, D.C. 20036

American National Standards Institute, 1430 Broadway, New York, N.Y. 10018

American Paper Institute, 260 Madison Ave, New York, N.Y. 10016

American Plywood Association, 1119 A Street, Tacoma, Washington 98401

American Society of Civil Engineers, 345 East 4th Street, New York, N.Y. 10017

American Society of Concrete Construction, 329 Interstate Road, Addison, Illinois 60101

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 345 E. 4th Street, New York, N.Y. 10017

American Society of Landscape Architects, 1425 H St., N.W. Washington, D.C. 20005

American Society of Mechanical Engineers, 345 E. 4th St., New York, N.Y. 10017

American Society for Testing and Materials, 1916 Race St., Philadelphia, Pennsylvania 19103

American Subcontractors Assn., 815 15th St., N.W., Suite 902, Washington, D.C. 20005

American Walnut Manufactures Assn., Rm. 1729, 666N. Lake Shore Drive, Chicago, Illinois 60611

American Wood Council, 1619 Massachusetts Ave., N.W., #500, Washington, D.C. 20036

American Wood-Preservers' Association, 1625 I-Street, NW, Washington, D.C. 20006

American Wood Preservers Bureau, P.O. Box 6085, Arlington, VA 22206

American Wood-Preservers Institute, 111 W. Washington St., Chicago, IL 60602

American Wood Preservers Institute, 1651 Old Meadow Rd., McLean, VA 22101

Appalachian Hardwood Manufacturers Assoc., Inc., Space 408, North Carolina National Bank Building, High Point, NC 27461

Architectural Aluminum Manufactures Assn., 410 N. Michigan Ave., Chicago, Illinos 60611

Architectural Woodwork Institute, Chesterfield House-Suite A., 5055 S. Chesterfield Road, Arlington, VA 22206

Asphalt and Vinyl Asbestos Tile Institute, 101 Park Ave., New York, N.Y. 10017

Asphalt Institute, Asphalt Institute Bldg., College Park, MD 20740

Asphalt Roofing Manufactures Assn., 757 Third Ave., New York, N.Y. 10017

Associated General Contractors of America, INC. 1957 E. St., NW., Washington, D.C. 20006

Battelle Memorial Institute, Columbus Labs, 505 King Ave., Columbus, Ohio 43201

BRAB-Federal Construction Council, 2101 Constitution Ave., Washington, D.C. 20418

Building Research Advisory Board, National Research Council, National Academy of Sciences, 2101 Constitution Ave., NW, Washington, D.C. 20418

Building Research Institute, 2101 Constitution Ave., NW, Washington, D.C. 20418

Bureau of the Census, Construction Reports-Housing, Dept. of Commerce, Washington, D.C. 20402

California Redwood Assoication, 617 Montgomery Street, San Francisco, CA 94111

Canadian Hardwood Veneer and Plywood Bureau, Canadian Lumbermen's Assn., Timber House, 27 Goulbourn Ave., Ottowa 2, Ontario, Canada

Carpet and Rug Industries, Inc. P.O. Box 2048, Dalton, GA 30720

Cast Iron Pipe Research Assn., Suite 323, 1211 W. 22nd St., Oak Brook, IL 60521

Center For Building Technology, National Bureau of Standards, Washington, D.C. 20234

Chamber of Commerce of the U.S., Community and Regional Development Group, 1615 H. Street, NW, Washington, D.C. 20006

Clay Products Association, 597 York Rd., Elmhurst, IL 60126

Concrete Masonry Assn. of Illinois, 7456 N. Harlem Ave., Chicago, IL 60648

Concrete Reinforcing Steel Institute, 228 N. LaSalle St., Chicago, IL 60601

Copper Institute, 50 Broadway, New York, N.Y. 10004

Craftsman Book Company of America, 124 South LaBrea Ave., Los Angeles, California 90036

Division of Building Research of Canada, National Research Council, Montreal Road, Ottawa 7, Canada

Edison Electric Institute, 90 Park Avenue, New York, N.Y. 10016

Electric Heating Assn., Inc. 437 Madison Ave., New York, N.Y. 10022

Electronic Industries Association, 2001 Eye Street, NW, Washington, D.C. 20006

Energy Research and Development Adm. (EROA) Office of Conservation, Division of Buildings and Community Systems, Washington, D.C. 20545

Expanded Shale, Clay and Slate Institute, 1041 National Press Bldg., Washington, D.C. 20004

Facing Tile Institute, 111 E. Wacker Drive, Chicago, IL 60601

Fine Hardwoods-American Walnut Association, 666 North Lake Shore Drive Chicago, Illinois 60611

Fir and Hemlock Door Association, 700 Yeon Bldg., Portland, OR 97204

Forest Farmers Association, Four Executive Park East, NE, Atlanta, GA 30329

Forest Products Laboratory, Forest Service - USDA, P.O. Box 5130, Madison, Wisconsin 53705

Forest Products Research Society, 2801 Marshall Court, Madison, WI 53705

Furniture Manufacturers' Association, 220 Lyon St., Grand Rapids, MI 49502

Gas Appliance Manufacturers Assn., 1901 N. Fort Myer Drive, Arlington, VA 22209

Gypsum Association, 201 N. Wells Street, Chicago, IL 60606

Hardwood Dimension Manufacturers' Association, 3813 Hillsboro Road, Nashville, TN 37215

Hardwood Institute (A Division of National Hardwood Lumber Association) P.O. Box 5116, Fort Wayne, IN 46805

Hardwood Plywood Manufacturers' Association, P.O. Box 6246, Arlington, VA 22206

Hardwood Research Council, 610 Stearns Building, P.O. Box 961, Statesville, North Carolina 28677

Home Ventilating Institute, 230 N. Michigan Ave., Chicago, IL 60601

IIT Research Institute, 10 West 35th St., Chicago, IL 60616

Illuminating Engineering Society, 345 E. 47th Street, New York, N.Y. 10017

Imported Hardwood Products Association, Inc., World Trade Center, Ferry Building, Room 262, San Francisco, CA 94111

Indiana Limestone Institute of America, Inc., Suite 400, Stone City National Bank Building, Bedford, Indiana 47421

Institute for Applied Technology, National Bureau of Standards, Washington, D.C. 20234 Publications: Building Science Series, Technical Notes, Handbooks, Consumer Information, Special Publications, and NBS Interagency Reports.

Insulation Board Institute, 111 W. Washington St., Chicago, IL 60602

International Assn. of Wall and Ceiling Contractors, 20 E. St., NW., Washington, D.C. 20001

Maple Flooring Manufacturers' Association, 424 Washington Ave., Oshkosh, Wisconsin 54901

Marble Institue of America, 1984 Chain Bridge Rd., McLean, VA 22101

Mason Contractors Assn. of America, Inc. 208 S. LaSalle St., Chicago, IL 60604

Mechanical Contractors Assn. of America, Inc. 5530 Wisconsin Ave., Chevy Chase, MD 20015

Metal Lath Assn. 221 N. LaSalle St., Chicago, IL 60601

Mobile Homes Manufacturers' Association, P.O. Box 201, Chatilly, VA 22021

NAHB Research Foundation, Inc., P.O. Box 1627, 627 Southlawn Lane, Rockville, MD 20850

National Assn. of Architectural-Metal Manufactures, 228 N. LaSalle Street, Chicago, IL 60601

National Association of Building Manufacturers, 8401 Connecticut Ave., Suite III Washington, D.C. 20036

National Association of Furniture Manufacturers' Inc. 666 North Lake Shore Drive, Rm. 1727, Chicago, IL 60611

National Association of Home Builders of the U.S., 1625 L Street, NW., Washington, D.C. 20036

National Association of Manufacturers, 277 Park Ave., New York, N.Y. 10017

National Assn. of Plumbing-Heating-Cooling Contractors, 1016 20th St., NW., Washington, D.C. 20036

National Builder's Hardware Assn., 1290 Ave., of the Americas, New York, NY 10019

National Building Material Distributors Association, 221 North LaSalle Street, Chicago, Illinois 60601

National Cellulose Insulation Manufacturers Association, 220 Seegers Ave., Elk Grove, IL 60007

National Concrete Masonry Assn., 2009 14th St., N. Arlington, VA 22201

National Electrical Contractors Assn, Inc., 1730 Rhode Island Ave., NW., Washington, D.C. 20036

National Electrical Manufacturers Assn. 155 E. 44th St., New York, N.Y. 10017

National Forest Products Association, 1619 Massachusetts Ave., NW, Washington, D. C. 20036

National Hardwood Lumber Association, 332 S. Michigan Ave., Chicago, IL 60604

National Kitchen Cabinet Association, 334 E. Broadway, Suite 248, Louisville, Kentucky 40202

National Lumber and Building Materials Dealers Association, 1990 M Street, NW, Suite 350, Washington, D.C. 20036

National Lumber Exporters Association, 805 Sterick Building, Memphis, TN 38103

National Mineral Wool Insulation Assn., 382 Springfield Ave., Summit, NJ 07901

National Oak Flooring Manufacturers' Association, 814 Sterick Building, Memphis, TN 38103

National Paint and Coatings Association, 1500 Rhode Island Ave., NW, Washington, D.C. 20005

National Particleboard Association, 2306 Perkins Place, Silver Spring, MD 20910

National Pest Control Association, Inc. 250 W. Jersey St., Elizabeth, N.J. 07207

National Ready Mixed Concrete Assn., 900 Spring St., Silver Spring, MD 20910

National Roofing Contractors Association, 1515 N. Harlem, Oak Park, IL 60302

National Retail Hardware Association, 964 N. Pennsylvania St., Indianapolis, Indiana 46204

National Safety Council, 425 N. Michigan Ave., Chicago, IL 60611

National Sash and Door Jobbers Association, 20 North Wacker Drive, Chicago, IL 60606

National Slate Assoication, 455 W. 23rd St., New York, N.Y. 10011

National Solar Heating and Cooling Information Center, P.O. Box 1607, Rockville, MD 20850

National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22151

National Technical Services Association (NTSA) 111 E. Wacker Drive, Chicago, IL 60601

National Terrazzo and Mosaic Association, Inc. 716 Church St., Alexandria, VA 22314

National Woodwork Manufacturers' Association, 400 West Madison, Chicago, IL 60606

North American Wholesale Lumber Association, 180 Madison Ave. New York, N.Y. 10016

Northeastern Lumber Manufacturers Assn., Inc. 11-17 South St., Glen Falls, New York 12801

Office of Consumer Affairs, Public Affairs, Dept. of HEW, 330 Independence Avenue, S.W., Washington, D.C. 20201

Painting and Decorating Contractors of America, 2625 W. Peterson Avenue, Chicago, IL 60645

Perlite Institute, Inc., 45 West 45th St., New York, N.Y. 10036

Philippine Mahogany Association, Inc., P.O. Box 3362, Tacoma, WA 98499

Pittsburgh Testing Laboratory, 850 Poplar St., Pittsburgh, PA 15220

Plastic Pipe Institute, Division of the Society of the Plastic Industry, Inc., 250 Park Ave., New York, N.Y. 10017

Plywood Research Foundation, 1119 A Street, Tacoma, WA 98401

Ponderosa Pine Woodwork Assn., 1500 Yeon Building, Portland, OR 97204

Ponderosa Pine Woodwork Assn., 39 S. La Salle St., Chicago, IL 60603

Porcelain Enamel Institute, Inc., 1900 L St., N.W., Washington, D.C. 20036

Portland Cement Association, Old Orchard Rd., Skokie, IL 60067

Public Interest Research Group, 2000 P Street., NW, Suite 711, Washington, DC 20201

Red Cedar Shingle and Handsplit Shake Bureau, 5510 White Bldg., Seattle, Washington 98101

Small Homes Council-Building Research Council, 1 E. St. Mary's Rd., Champaign, Illinois 61820

Society of American Registered Architects, 111 E. Wacker Drive, Chicago, Illinois 60601

Society of American Wood Preservers, Inc. Suite 1004, 1501 Wilson Blvd., Arlington, VA 22209

Society of Plastics Industry, 250 Park Ave., New York, N.Y. 10017

Society of Real Estate Appraisers, 7 S. Dearborn St., Chicago, IL 60603

Solar Energy Industries Assn., 1001 Connecticut Ave., NW, Suite 800, Washington, D.C. 20036

Southern Cypress Manufacturers' Association, 1614 Berwick Road, Jacksonville, Florida 32207

Southern Forest Products Association, Jefferson Bank Building, P.O. Box 52468, New Orleans, LA 70152

Southern Furniture Manufactures' Association, P.O. Box 951, High Point, NC 27261

Southern Hardwood Lumber Manufacturers' Association, 805 Sterick Building, Memphis, TN 38103

Southern Pine Inspection Bureau, Box 846, Pensacola, Fla. 32502

Southwest Research Institute, 8500 Culebra Rd., San Antonio, TX 78228

Stanford Research Institute, Menlo Park, California 94025

Steel Door Institute, 2130 Keith Bldg., Cleveland, Ohio 44115

Steel Joist Institute, Suite 707, 2001 Jefferson Davis Hwy., Arlington, VA 22202

Steel Window Institute, 2130 Keith Bldg., Cleveland, OH 44115

Structural Clay Products Institute, 1750 Old Meadow Rd., McLean, VA 22101

Stucco Manufacturers Association, Inc., 15926 Kittridge, Van Nuys, Calif., 91406

Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

TECO (Timber Engineering Company), 5530 Wisconsin Ave., Washington, D.C. 20015

The Construction Specifications Institute, 1717 Massachusetts Avenue, NW, Washington, D.C. 20036

The Contractors' Association of America, 112 N. Alfred, Alexandria, VA 22314

Tile Council of America, Inc., 360 Lexington Ave., New York, NY 10017.

Timber Products Manufacturers, 951 East Third Ave., Spokane, WA 99202

ULI-The Urban Land Institute, 1200 18th St., N.W., Washington, D.C. 20036

Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, IL 60611

USERDA, Office of Public Affairs, Washington, D.C. 20545

U.S. Metric Assn., Inc. Sugarloaf Star Route, Boulder, Colorado 80302

United States Savings and Loan League, 111 E. Wacker Dr., Chicago, IL 60601

Vacum Wood Preservers Institute, 5151 S. Loop, E., Houston, TX 77033

Vermiculite Institute, 141 W. Jackson Blvd., Chicago, IL 60604

Water Conditioning Foundation, P.O. Box 194, 1780 Maple St., Northfield, IL 60093

West Coast Lumber Inspection Bureau, P.O. Box 25406, Portland, OR 97225

Western Building Material Assn., P.O. Box 1699, Olympia, WA 98507

Western Forest Industries Association, 1500 SW. Taylor St., Portland, OR 97205

Western Red and Northern White Cedar Association, P.O. Box 2786, New Brighton, Minn. 55112

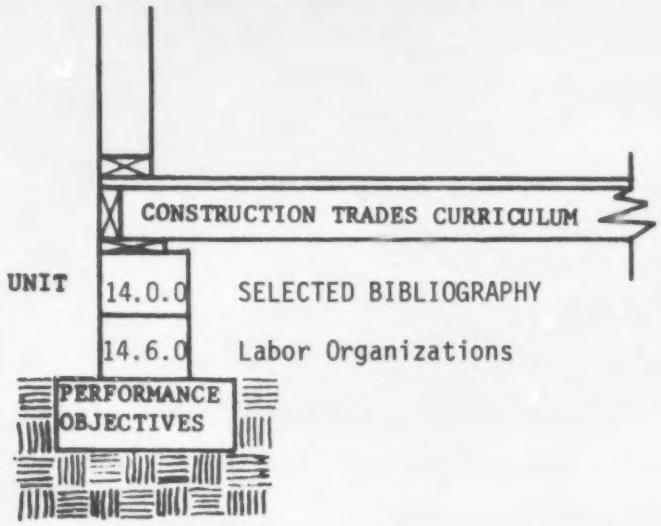
Western Red Cedar Lumber Assn., 700 Yeon Bldg., Portland, OR 97204

Western Wood Moulding and Millwork Producers, Inc., P.O. Box 25278, Portland, OR 97225

Western Wood Products Association, 700 Yeon Building, Portland, OR 97204

Wire Reinforcement Institute, 5034 Wisconsin Ave., NW., Washington, D.C. 20016

Woodworking Machinery Manufacturers of America, 1900 Arch Street, Philadelphia, PA 19103



Boilermakers, Iron Shipbuilders, Blacksmiths, Forgers and Helpers; International Brotherhood of (AFL-CIO), 8th at State Ave, Kansas City, Kansas 66101.

Bricklayers, Masons and Plasterers', International Union of America, 815 15th Street, N.W., Washington, D.C. 20005.

Carpenters and Joiners of America; United Brotherhood of (AFL-CIO), 101 Constitution Ave., N.W., Washington, D.C. 20001.

Electrical Workers; International Brotherhood of (AFL-CIO), 1200 15th Street, N.W., Washington, D.C. 20005.

Engineers; International Union of Operating (AFL-CIO), 1125 17th Street, N.W., Washington, D.C. 20006.

Glass Workers' Union of North America; American Flint (AFL-CIO), 1440 South Byrne Road, Toledo, Ohio 43614.

Iron Workers; International Association of Bridge, Structural and Ornamental (AFL-CIO), 3615 Olive Street, St. Louis, Missouri 63108.

Laborers' International Union of North America (AFL-CIO), 905 16th Street, N.W., Washington, D.C. 20006.

Lathers International Union; The Wood, Wire and Metal (AFL-CIO), 6530 New Hampshire Avenue, Takoma Park, Maryland 20012.

Marble, Slate and Stone Polishers, Rubbers and Sawyers, Tile and Marble Setters' Helpers and Marble, Mosaic and Terrazzo Workers' Helpers; International Association of (AFL-CIO), 815 15th Street, N.W. Washington, D.C. 20005.

Painters and Allied Trades; International Brotherhood of (AFL-CIO) 1925 K Street, N.W., Washington, D.C. 20006.

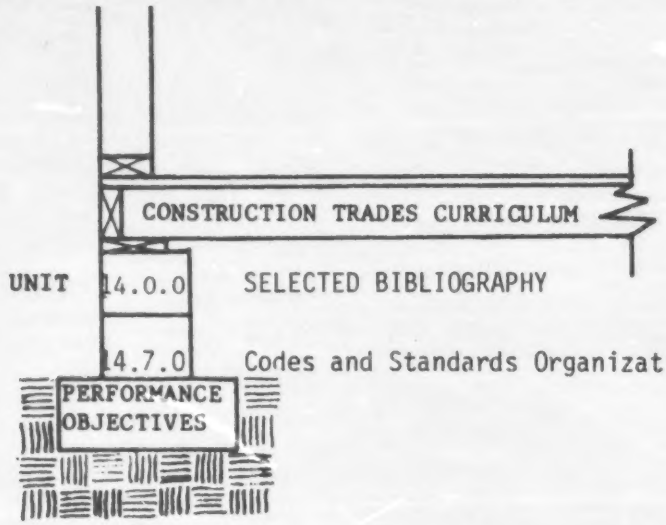
Plasterers' and Cement Masons' International Association of the United States and Canada; Operative (AFL-CIO), 1125 17th Street, N.W., Washington, D.C. 20036.

Plumbing and Pipe Fitting Industry of the United States and Canada; United Association of Journeymen and Apprentices of the (AFL-CIO), 901 Massachusetts Ave., N.W., Washington, D.C. 20001.

Roofers, Damp and Waterproof Workers Association; United Slate, Tile and Composition (AFL-CIO), 1125 17th Street, N.W., Washington, D.C. 20036.

Sheet Metal Workers' International Association; (AFL-CIO), 1000 Connecticut Avenue, N.W., Washington, D.C. 20036.

Teamsters, Chauffeurs, Warehousemen and Helpers of America; International Brotherhood of (IND.), 25 Louisiana Avenue, N.W., Washington, D.C. 20001.



American Insurance Assn., 110 Williams St., New York, N.Y. 1000
National Building Code.

American National Standards Institute, 1430 Broadway, New York, N.Y. 10018
National Plumbing Code.

American Society For Testing And Materials, 1916 Race Street, Philadelphia, PA 19103; Materials Evaluation and Specifications Standards.

Building Officials and Code Adms. Int'l., 1313 E. 60th St., Chicago, Ill. 60637

Building Officials Conference of America, Inc., 1313 E. 60th St., Chicago, Ill. 60600; Basic Building Codes. Abridged Building Code (Residential).

Construction Bookstore, Inc., 1115 N. Main St., Gainesville, Fla. 32601
Basic Building Code (BOCA -1970), Southern Building Code (1973), Southern Standard Gas Code (1973), Southern Standard Mechanical Code (1971), Southern Standard Plumbing Code (1971), Uniform Building Code (1973), National Plumbing Code (1955).

Department of Housing and Urban Development, Federal Housing Administration, Washington, D.C. 20411; Hud Minimum Property Standards, 1973 Ed.
Vol. I. Minimum Property Standards For One And Two Family Dwellings, 4900.1. Vol. II. Minimum Property Standards For Multifamily Housing, 4910.1. Vol. III. Minimum Property Standards For Care-Type Housing, 4920.1. Vol. IV. Manual of Acceptable Practices, 4930.1.

General Services Administration (GSA), Washington, D.C. 20409. Federal Specifications and Standards.

Illinois Dept. of Public Health, Consumer Health Protection, 535 W. Jefferson St., Springfield, IL 62701. Illinois State Plumbing Code.

International Conference of Building Officials, 50 Los Robles Ave., Pasadena, CA 91100. Uniform Building Code-Vol. I. Uniform Building Code Standards-Vol. II. Uniform Housing Code.

National Association of Home Builders, Manpower Department, 15th and M Sts., N.W., Washington, D.C. 20005; Performance Standards For The Residential Carpentry Craft - Incentive Apprenticeship Training.

National Fire Protection Assn., 60 Batterymarch St., Boston, MA 02110 National Electric Code.

Office of Building Standards and Codes Services Center for Building Technology, National Bureau of Standards, Washington, D.C. 20234. Standards For Energy Conservation-Design and Evaluation Criteria for Energy Conservation in New Buildings.

Product Standards Section, National Bureau of Standards, Office of Engr. Stds. Service, U.S. Dept. of Commerce, Washington, D.C. 20234. Product Standards.

Southern Building Code Congress, 1116 Brown-Marx Bldg., Birmingham, AL 35203 Southern Standard Building Code: SSBC Part I (Building). SSBC Part II (Gas). SSBC Part III (Plumbing).

U.S. Department of Health, Education and Welfare, National Institute for Occupational Safety and Health, Public Health Service Center for Disease Control, Cincinnati, Ohio 45202. Occupational Health and Disease Exposure Guidelines. Recommendations and Standards.

U.S. Dept. of Labor, Manpower Administration, Bureau of Apprenticeship and Training, Washington, D.C. 20210. Carpentry Apprenticeship Training Standards - National Apprenticeship and Training Standards for Carpentry, 1973.

U.S. Dept. of Labor, Occupational Safety and Health Ad., Washington, D.C. 20210 OSHA Safety Standards. Federal Register-Occupational Safety and Health Standards, Vol. 37, #202, Part II, 1972. Federal Register-Safety and Health Regulations for Construction, Vol. 37, #243, Part II, 1972.

Western Plumbing Officials Assn., 520 Mission Rd., South Pasadena, CA 91030 Uniform Plumbing Code. Uniform Heating and Comfort Cooling Code.